Instruments

THE MAGAZINE ~~OF~~

Measurement and Control

Vol. 16
SEPT. 1943
No. 9

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SEP 28 1943

INCLUDING

Aviation Instruments

TAG

Indicating and Recording Instruments for a Wide Range of Industrial Process Control . . . . . .

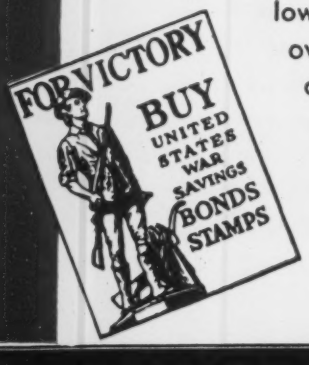
Today, thousands of TAG Recording and Controlling Instruments are in effective service in the synthetic rubber, chemical catalytic cracking, aeroplane engine testing, ordnance, and food fields. Now, when uninterrupted production is vital—where needless reruns would set back the war effort—you particularly need the well demonstrated control efficiency that TAG provides.

The TAG High Sensitivity (On-Off) Recorder-Controller is a popular instrument because it is simple in construction and does its work well on most industrial applications where process time lag is small and the heat capacity is large.

The TAG Fall Range Throttling Recorder-Controller is ideally suited to processes where load changes are small and of short duration. In addition to the control unit, this instrument utilizes a full range throttling flapper mechanism and is recommended for use on applications of considerable process lag, or of small heat capacities.

The TAG Full Range Throttling Recorder-Controller with Automatic reset is designed for difficult control applications where large load changes that extend over a long period are encountered. This design lowers the control sensitivity and prevents over-controlling or hunting. And, because of this reset feature, the Controller will not shift from the set point.

Catalog No. 1200-I will give you complete information.



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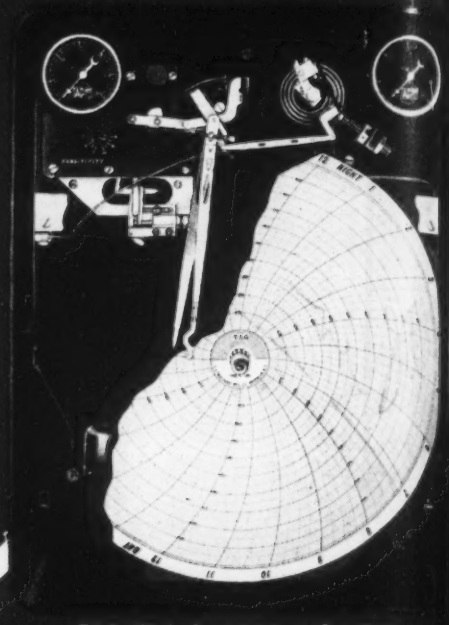
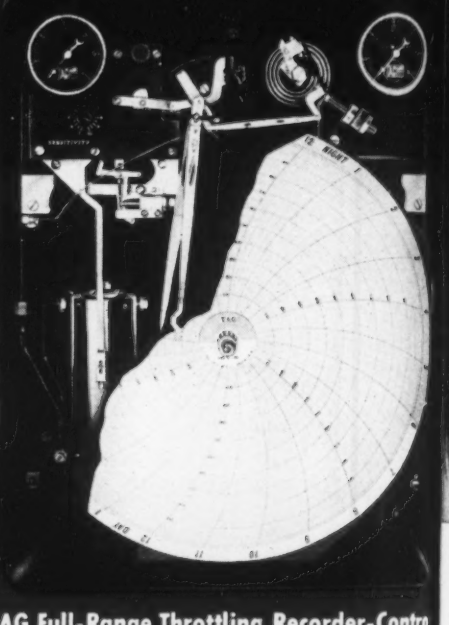
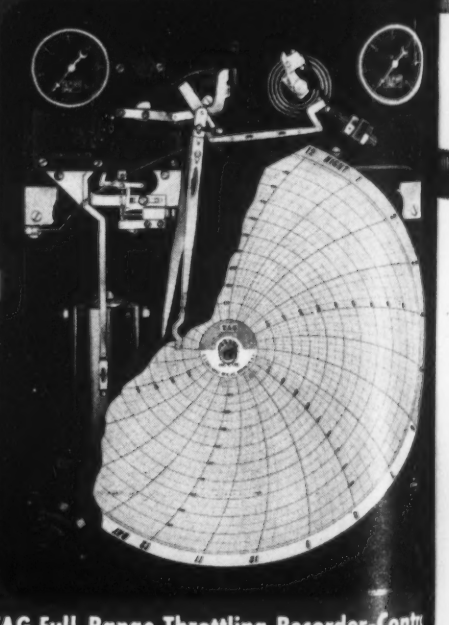


TAG High Sensitivity (On-Off) Recorder-Controller



TAG Full-Range Throttling Recorder-Contro



TAG Full-Range Throttling Recorder-Contr with Automatic Reset

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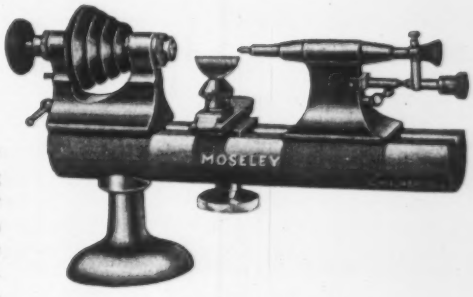
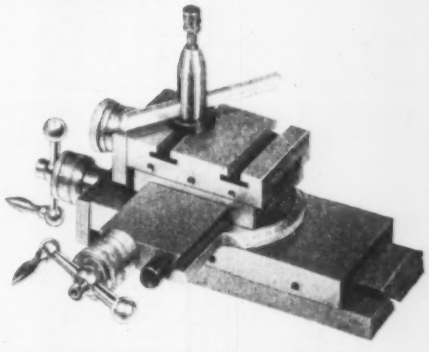
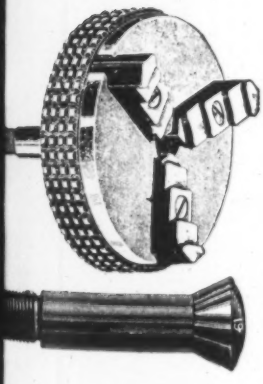
Another Plane Returns Safely



PRECISION TOOLS play a vital role in safeguarding the lives of our pilots. Their instruments MUST perform under all conditions — they MUST NOT fail. The success of their mission — the safe return of the ship and crew — these things depend upon the accuracy of the instruments and the tools that repair them.





The men at Marshall's are doing their part by speeding up production on the finest precision lathe known. Precision built throughout, yet rugged enough to stand hard usage. Our entire manufacturing plant has been turned over to this important industry and every day sees us delivering more precision tools to the men on the home front and the boys on the war front.

We also carry a complete line of HAND TOOLS that includes fine quality Tweezers, Pliers, Hammers, Mallets, and other items pertaining to shop equipment.

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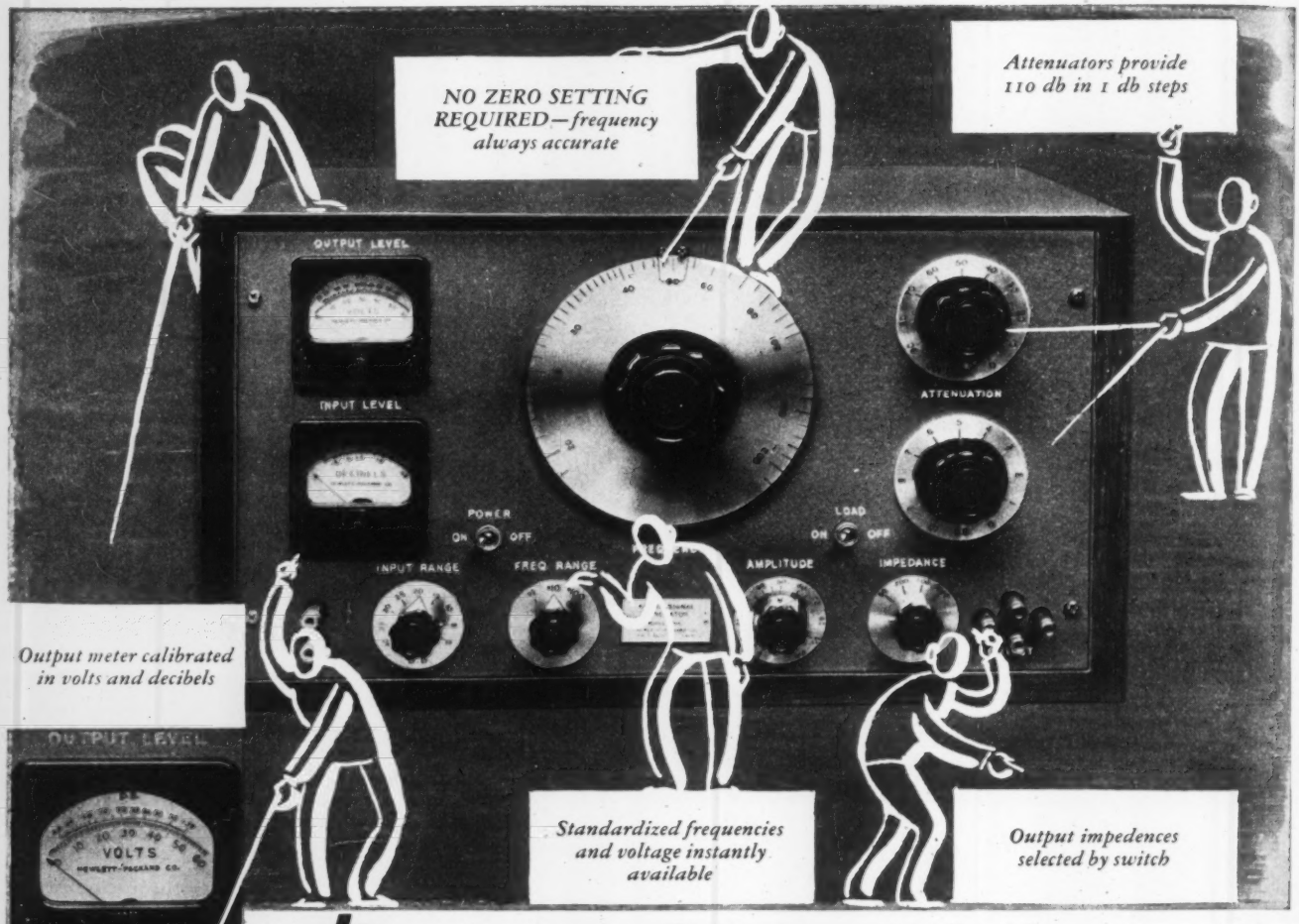
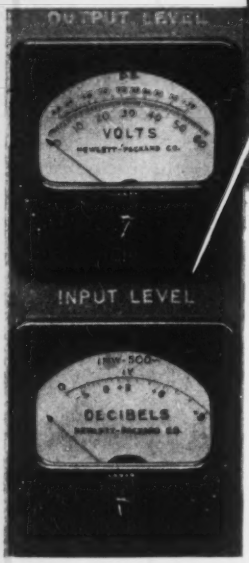




Separate input meter for making gain measurements

Six reasons why this

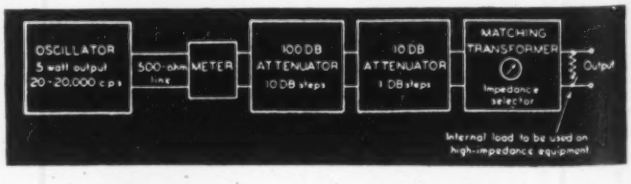
AUDIO SIGNAL GENERATOR

saves your time and insures better accuracy

This all-in-one combination of instruments insures the utmost of speed without sacrifice of accuracy in making certain laboratory and production measurements. The model 205AG consists of an *-hp-* Resistance Tuned Audio Oscillator, an output meter, attenuator and an impedence matching system. In addition a separate input meter is provided. Thus no auxiliary equipment is required in making gain measurements. It is ideal for general laboratory applications because it supplies a known voltage and a known frequency at the commonly used impedence levels.

Of outstanding importance is the fact that the Resistance Tuned Oscillator requires no zero setting. The frequency drift is negligible even during the first few minutes of operation. The constant output of this oscillator makes it ideal for checking frequency response of apparatus. Waveform distortion is very small, hence this instrument provides an excellent source of voltage for distortion measurements.

Below is a block diagram showing the arrangement of the components in the Model 205AG Audio Signal Generator. Get full information about this and other *-hp-* laboratory instruments. Ask for your copy of the 26-page fully illustrated catalog which gives valuable data on making tests and measurements as well as details of the *-hp-* line of instruments.



HEWLETT-PACKARD COMPANY

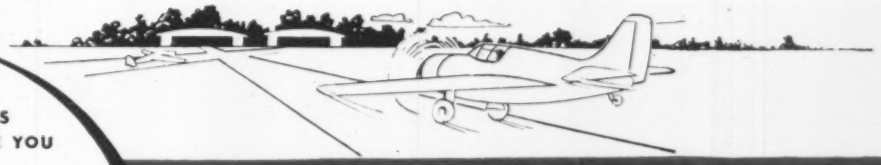
672

Box 1135 M Station A, Palo Alto, California

Dunco Type 17AXX

A SHOCK-PROOF RELAY THAT'S REALLY SHOCKPROOF

Here's a relay on which the contacts won't operate unintentionally—the Struthers-Dunn Type 17AXX, especially designed for rough and tumble airplane use. It is small in size, light in weight. It meets and exceeds all specified requirements for this type of unit. For instance, actual tests have shown that it will withstand an acceleration test of *better* than 90 gravitational units—or from eight to ten times better than ordinary "good" relays. This, of course, means that all components are exceptionally rugged, and that construction of the entire assembly is designed to match this ruggedness. Dunco Type 17AXX Relays are regularly supplied with series coils for any direct current, or with shunt coils for use on 12- or 24-volts D.C.



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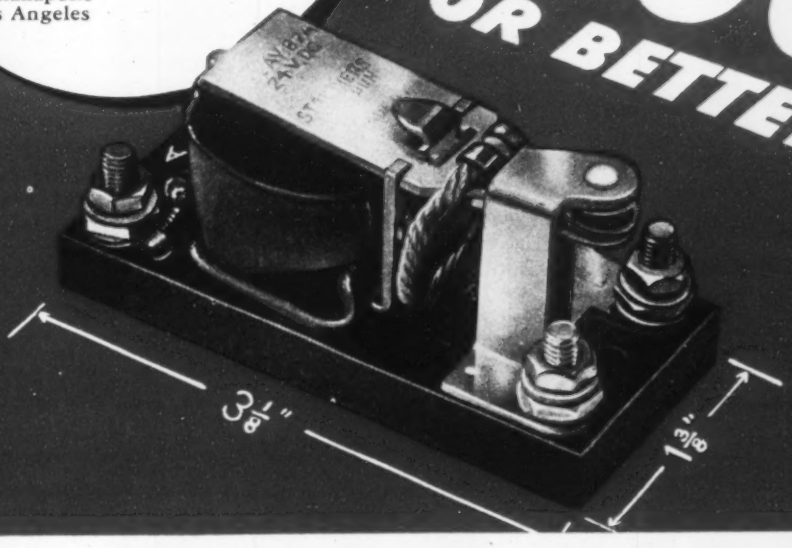
WITHSTANDS 90 G's OR BETTER



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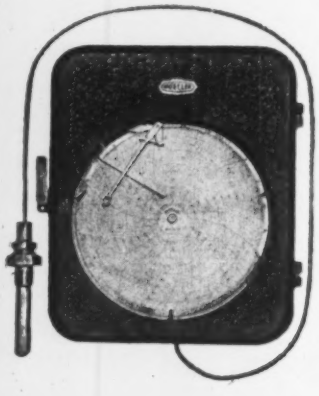
Made with "Moeller Glass Red Reading Column," making them easy to read under varying light conditions, at a considerable distance and over a wide range.

MOELLER DIAL THERMOMETERS. Made in various scale ranges up to 1000°F. or equivalent. Metal and Phenolite cases.



MOELLER RECORDING THERMOMETERS

Furnished in various ranges up to 1000°F. or equivalent. Round or square cases.

Also HYGROMETERS
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Instruments

Vol. 16 SEPTEMBER 1943 No. 9

SPECIAL ISSUE
WPB Orders Affecting Instruments

COVER: "Shop supervisor George Cole explains testing processes to Edith Krause. . . ."
OWI photo by Hollem
[This being a special government issue I'm happy to comply with recent WMP suggestion that editors feature women workers—and to do it by using a government photograph.—MFB]

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Built To Take It

One virtue all of Uncle Sam's bombers share. They can take, as well as give, brutal punishment. "Tough to knock out of the sky" is the enemy's grudging admission . . . and he ought to know. "She must come home to bomb another day" is the thought behind the painstaking construction Boeing puts into its world-famous Flying Fortress. And that's one reason why many of the engine instruments in these bombers are made by Lewis. Lewis instruments, too, are built to take punishment and still give a true picture of engine performance.

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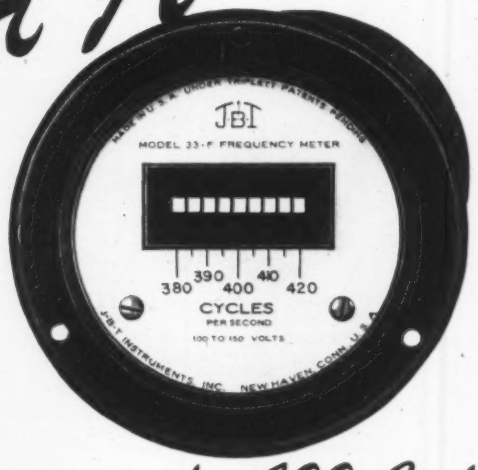
Sound your 'A'

We're going to "tune" a 400 cycle meter



Pitch pipes or ordinary tuning-forks are good enough for *musical* instruments where human error is expected—but not for *electrical* instruments. Tuning-fork electronic oscillators of our own design are used to calibrate J-B-T Vibrating Reed Frequency Meters because this is the most scientific, most accurate method we know of. Reeds are calibrated *twice*—once before assembly and later in the completed instrument. Before shipment each instrument is given a *final* check for accuracy of resonance.

Equally important to you is the J-B-T practice of "engineering" the *instrument* to fit the *job*. Take the new 400 cycle meter at the right. To obtain full reed amplitude *with* low power consumption at 400 cycles, special design and construction are required. For example, the reed mounts are considerably longer than in models for lower frequencies, and both driving coil and permanent magnets are mounted near the free ends of the reeds.

The new 400 cycle meter, like all other J-B-T Vibrating Reed Frequency Meters, requires no adjustment while in service, even under adverse vibration conditions. It is not affected by wave form, normal temperature changes or external magnetic fields. Simply READ the REED and that's your frequency.

For full description of the complete line of J-B-T Vibrating Reed Frequency Meters, send for Bulletin VF-43.

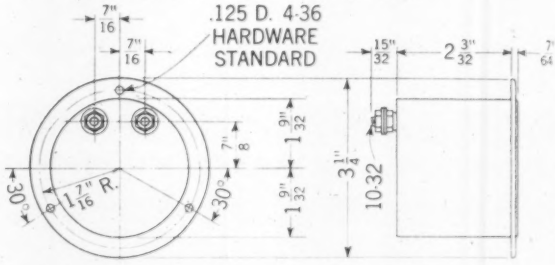
J-B-T

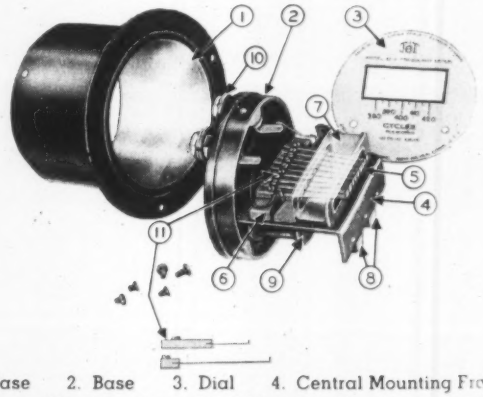
MODEL 33-F *for 400 Cycles*

Size . . . 3¼" flange diameter. Black metal* case for flush panel mounting. Single window type . . . 9 to 11 reeds.** Five or ten cycle increments. Accuracy . . . 0.3% under normal operating temperatures. Minimum voltage . . . 100. Power consumption . . . 1.75 watts. Ohms per volt . . . 70.— at 400 cycles.

*Molded 3½" case to meet ASA specifications C39.2-1943 for mounting will be available shortly.

**9-reed instruments for 380-420 cycles in production; other ranges and reed groupings available on special order.





1. Case 2. Base 3. Dial 4. Central Mounting Frame
5. Spring Steel Reeds 6. Reed Mounting Bar 7. Driving Coil
8. Permanent Magnets 9. Series Resistor
10. Terminal Studs 11. Long Reed Mount

(Reed and reed mount from 60 cycle instrument for comparison)

(Manufactured under Triplett Patents and/or Patents Pending)

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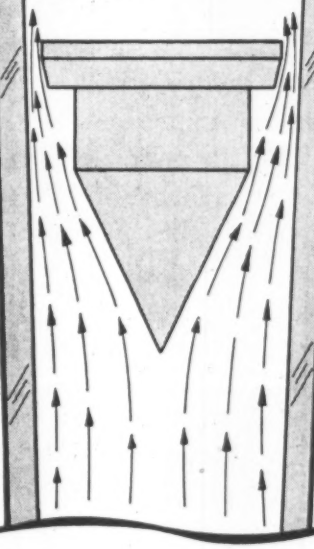
The ROTAMETER

—its basic advantages over head-type meters

8 BASIC ADVANTAGES

1. Metering elements and fluid being metered clearly visible
2. Wide flow range—20-to-1 easily obtained
3. Evenly spaced scale divisions—no compression of scale at low flows
4. Low, constant pressure drop—reduces pumping costs
5. New Stabl-Vis rotameter compensates for viscosity and density variations
6. 10" to 24" travel of metering float—accuracies correspondingly high
7. Instantaneous response to flow change—no friction or hysterisis
8. Measures corrosive gases, liquids and slurries that no other meter will handle accurately



1. Metering elements and fluid flow CLEARLY VISIBLE

Due to its transparent metering tube, the initial high accuracy of the rotameter may be readily checked and consistently maintained. At a glance the operator can actually see the condition of the rotameter float, the metering tube and the fluid flowing through the meter. The very minute that dirt starts to accumulate or that corrosion sets in, the flow may be by-passed and the rotameter quickly cleaned. No guesswork—no pressure lines to constantly blow down—no seal pots or sealing fluids required.

Furthermore, the accuracy of the remote-reading recording pen or indicating pointer may be quickly checked by comparison with the readings of the rotameter float. The operator at the rotameter sees the correct flow rate reading—so does the control man at the instrument panel.

Full visibility is but one of many basic advantages of the rotameter—a complete and informative explanation is given in our interesting booklet 10-A, entitled "A New Trend in Flow Rate Measurement." A copy of this valuable booklet will be sent to you gladly, without obligation.

FISCHER & PORTER PRODUCT INFORMATION

THE "ROTAMATIC"

Automatic Flow Rate Controller

If you will read the eight basic advantages of the rotameter given above, you will understand why the "Rotamatic" offers you a new and better method for flow rate control. For the first time, the rotameter is available in combination with automatic pneumatic control of improved design. All the limitations of flow control with fixed orifice meters are removed.

The "Rotamatic" gives "hair-line" control at any flow rate in the range of the rotameter connected to it—*plus* wide range, low pressure loss, straight line calibration, visible primary metering element and high accuracy. Available with electrical transmission, and also with magnetic transmission for services where there is an explosion hazard.

Every up-to-date Instrument Engineer ought to know about this new instrument for automatic flow control. For full details, write for bulletin 50A.

FISCHER & PORTER CO.

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F&P ROTAMETERS

RATE OF FLOW INDICATING, RECORDING OR CONTROLLING ROTAMETERS FOR ANY LIQUID OR GAS

PERMANENT MAGNETS MAY DO IT BETTER

Are You, Too, Planning For "*The Age of Electronics?*"

WITH many electronic developments proving successful on the battle-fronts, it's only natural for America's scientists and engineers—busy as they are—to sense the importance of peace-time applications from the miracles they have wrought. And the postwar results of their thinking will create "The Age of Electronics."

Whether you are manufacturing war matériel or planning peacetime products, have you considered incorporating the principle of the *permanent magnet?* Permanent magnets of our design and manufacture are used in many of the war's outstanding electronic developments and in countless other important devices—increasing their uses and improving their functions. 33 years of specializing in this *one* field has enabled us to make valuable engineering contributions. Very likely we can help *you*, too.

Though our plant (the nation's largest specializing in the making of permanent magnets) is devoted to war orders, our engineers will be glad to consult with you and give your problems the benefit of their unusual experience. Write for the address of our office nearest you and a copy of our 30-page "Permanent Magnet Manual."

Back the attack with an EXTRA Bond—and help increase production!

The
INDIANA STEEL PRODUCTS
Company

★ SPECIALISTS IN PERMANENT MAGNETS SINCE 1910 ★

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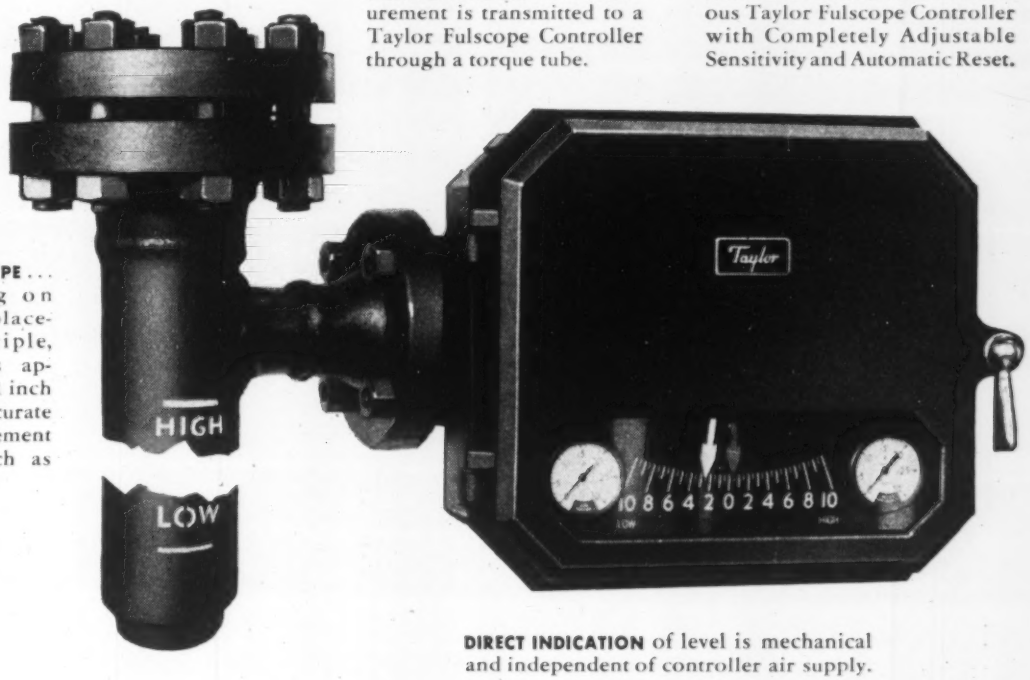
ON THE LEVEL

THIS NEW TAYLOR LEVEL-BUOY IS THE LAST WORD IN LIQUID LEVEL CONTROL

NO STUFFING BOX . . . Measurement is transmitted to a Taylor Fulscope Controller through a torque tube.

ALL THE ADVANTAGES of the famous Taylor Fulscope Controller with Completely Adjustable Sensitivity and Automatic Reset.

BUOYANCY TYPE . . . Operating on weight-displacement principle, float travels approximately 1 inch to give accurate level measurement over as much as 120 inches.



DIRECT INDICATION of level is mechanical and independent of controller air supply.

HERE'S a buoyancy type instrument that gives you not only *control* of level changes but *direct indication* as well! With or without Automatic Reset. A versatile, accurate instrument with *no stuffing box or internal pivots!*

1. **Smooth, Throttling Control** under the severest operating conditions as a result of Completely Adjustable Sensitivity (throttling range).
2. **"Averaging" Liquid Level Control** with minimum disturbances to process. Fully adjustable Automatic Reset restores level to optimum value.
3. **No Stuffing Box**—no pressure type bearings—measurement is transmitted through a torque tube. A sealed system *never* requiring lubrication or packing.
4. **No Internal Pivots** to cause friction or wear.
5. **Level Indication** is mechanical and independent of controller air supply.
6. **Available as a Remote Pneumatic Transmitter** to receiving indicators, recorders and/or controllers at a distant point.
7. **Handles Liquids** with specific gravities between .2 and 2.0.
8. **Numerous Standard Ranges**—14″, 32″, 60″, 72″, or 120″.
9. **Readily Adjustable to Changes in Specific Gravity.** A convenient adjustment compensates for normal variations in sp.gr. Greater variations accommodated by changing torque tube and/or torsion spring.
10. **Torque Tubes Interchangeable** with those used in Taylor's new Aneroid Manometers—a real advantage to large users of instruments.
11. **All Welded** construction. Stainless steel used where essential.
12. **Three-Position Alarm Devices** available at slight additional cost. Suitable for hazardous applications.

Ask your Taylor Field Engineer for full details at once! Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada. *Instruments for indicating, recording, and controlling temperature, pressure, humidity, flow, and liquid level.*

ARMY NAVY

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ACCURACY FIRST
IN HOME AND INDUSTRY

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Type C-2B-1A *(illustrated)* — developed especially for aircraft use. Well adaptable to blower applications, under most adverse conditions. Designed for continuous duty to operate in high ambient temperatures (will operate satisfactorily in a 90° ambient). Ball-bearing-equipped. Built in an aluminum die-cast housing. 1/100 H.P. 6, 12, 24, or 115 volts DC; 115 volts AC.

15 YEAR Performance Record

backs up your judgment when you select Oster motors

This record is your assurance that you are dealing with a seasoned, dependable source — that you are not "taking a chance." . . . Oster motors, used exclusively before the present war as original equipment on Oster motor-driven appliances, have helped to establish the world-wide reputation of these appliances — for fifteen years the recognized leaders in their field, widely used by the armed services and other departments of U. S. and foreign governments. . . . The same sound, conservative engineering — the same trained labor force and established precision standards — are behind the Oster motors now being built to power vital instruments and mechanisms in war planes and submarines . . . Illustrated is type C-2B-1A, 1/100 H. P. model in current production; other Oster models up to ¼ H.P. Let us help you fit this or other Oster motors to your requirements.

John Oster Mfg. Co. of Illinois, Dept. N-11. Genoa. Ill.

NEED HELP FAST?

See your local RCA Tube and Equipment Distributor

— your *Emergency Electronic Expediter*

RIGHT around the corner is a man you ought to know: your own local RCA Tube and Equipment Distributor.

Tackling tough jobs is his business—like locating tubes and other electronic equipment when you need them in a hurry to fill some priority order. For all you know, he probably carries them in stock. Can't hurt to find out anyway—and he may be able to save you a whole lot of trouble and unnecessary delay!

He has the kind of technical "know how", too, that you'll find mighty useful. His angle on how to use a piece of equipment is well worth listening to. Remember, the chances are he's been in radio since its early knee-pants days.

So next time you're stuck for stock, need something electronic in a howling hurry, or find yourself up against something that takes intelligent and tradewise expediting, get in touch *right away* with the man we've picked to serve as your *Emergency Electronic Expediter*.

If you don't know who he is, write us today.

for TECHNICALLY INFORMED SERVICE

NORMALLY ADEQUATE STOCKS

FAST DELIVERIES

INTELLIGENT EXPEDITING

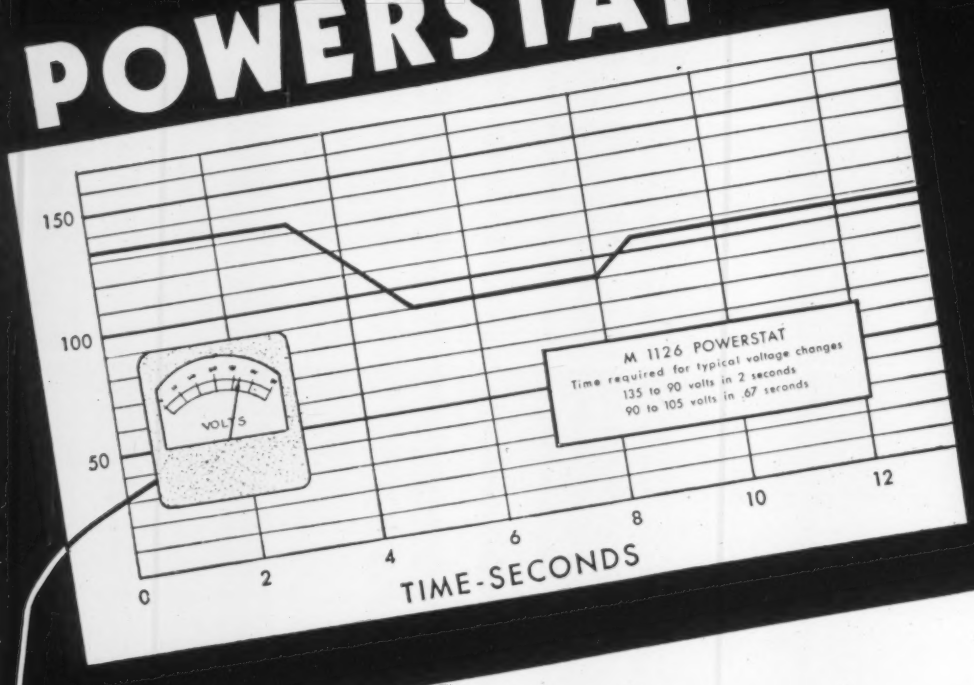
RCA ELECTRON TUBES

RCA Victor Division • RADIO CORPORATION OF AMERICA • Camden, N. J.

Certainly,

POWERSTAT

variable voltage transformers

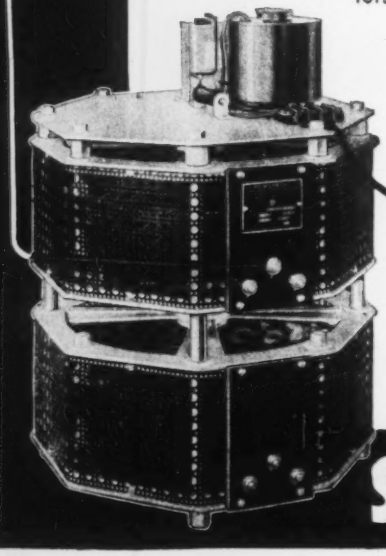


for REMOTE CONTROL

SECO'S Motor-Driven POWERSTAT Variable Transformers offer a highly efficient and accurate method of controlling AC power. It is unnecessary to bring heavy cable to cumbersome tap changers on switch boards or control desks. Simple wiring from your automatic control device or push button station to the pilot terminals of a Motor-Driven POWERSTAT Variable Transformer will enable the operator to control kilowatts of power safely and smoothly.

Where a self-contained piece of apparatus is required for rapidly controlling voltage to any desired value — investigate Motor-Driven POWERSTAT Variable Transformers. This equipment is used in radio transmitters, vacuum tube manufacture, electrical testing, induction heating, electric furnace temperature control, automatic voltage regulators and other applications where an efficient high quality control is required.

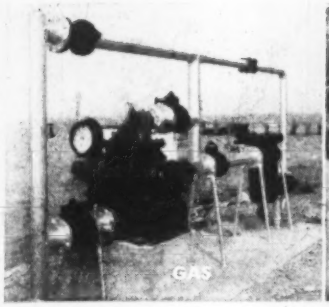
Standard types are available in sizes up to 75 KVA for 115, 230 or 440 volt operation on single or polyphase circuits.

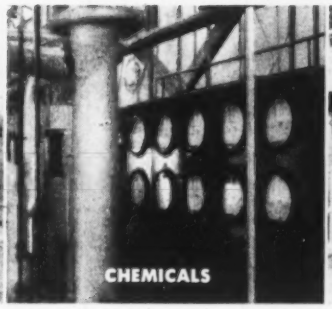


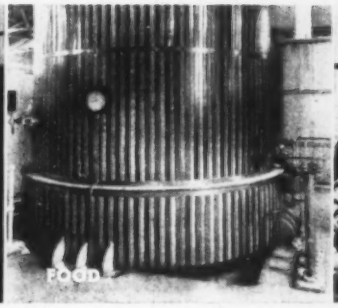
FOR FURTHER INFORMATION
SEND FOR THESE BULLETINS
POWERSTAT Variable Voltage Transformers 149 SI
SECO Automatic Voltage Regulators 163 SI

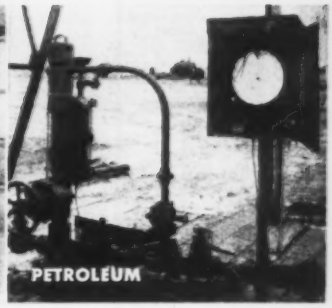
SUPERIOR ELECTRIC COMPANY
134 LAUREL STREET, BRISTOL, CONNECTICUT

SUPERIOR *Electric Company*









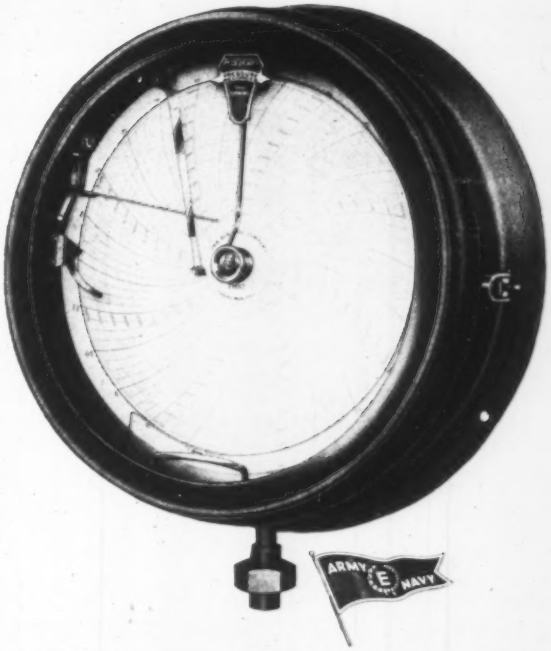
For Super-Pressures or Zephyr-Light Forces...

ACCURATE MEASUREMENTS, ACCURATELY RECORDED!

There's sound engineering reason why every properly-installed Foxboro Pressure Instrument gives dependable results throughout years of maintenance-free service. It has been specifically designed for its working conditions . . . to withstand continual fluctuations, corrosion, or other tough conditions of its particular job.

In more than 35 years of creative development, Foxboro has perfected a line of pressure instruments containing types exactly suited to each industrial service. For closest accuracy in *measurement* of pressures, there's a special measuring element for each range from full vacuum to 10,000 pounds. For special corrosive conditions, various special alloys are employed. And, to insure close fidelity in *recording* these measurements, Foxboro recorder movements have been individually engineered to reduce lost motion, friction and inertia to a negligible minimum!

No matter whether your jobs involve "zephyr-light" pressures, or pressures up to 10,000 pounds, you'll get



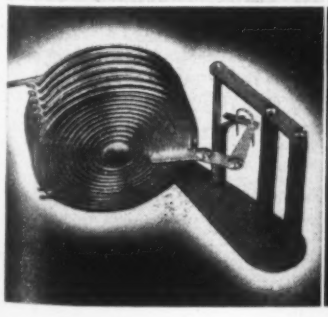
continuously accurate results from Foxboro Pressure Recorders, Controllers and Indicators.

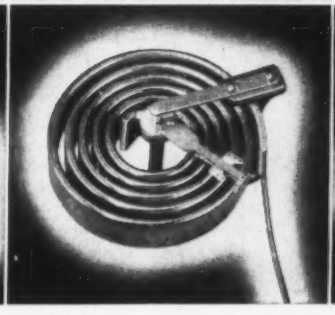
Write for complete Catalog 22A. **The Foxboro Company, 46 Neponset Ave., Foxboro, Mass., U. S. A.**

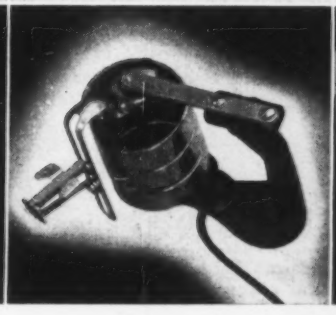
Pressure Recorders by FOXBORO

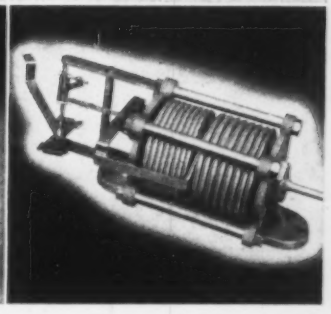
Reg. U. S. Pat. Off.

DIAPHRAGM ELEMENT	SPIRAL ELEMENT	HELICAL ELEMENT	HYDRON ELEMENT
Pressures from 1" of water to 5 lbs.	Pressures from 5 lbs. to 50 lbs.	Pressures from 50 lbs. to 10,000 lbs.	Pressures up to 50 lbs. absolute

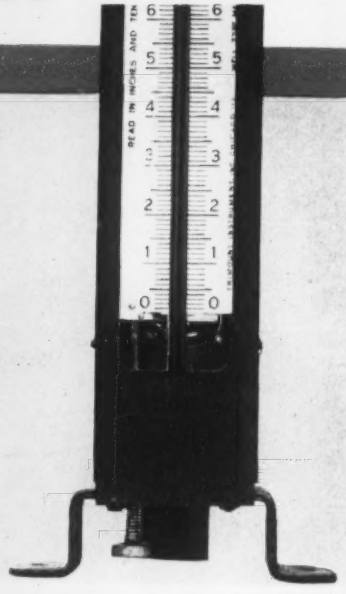








Read both PLUS AND MINUS pressures..



. . on the Same Instrument

SINGLE LEG absolute pressure gauges, originated by Trimount, permit direct reading, in absolute units, of both pressures and vacuums. No interpolations. No corrections for barometric pressure or temperature. Only one original setting required—an easy procedure. Complete range of sizes; highest quality.

NOTE: By means of special methods devised by Trimount, absolute pressure gauges can now be shipped to you ready for installation. No need to wait for a factory representative to deliver them.

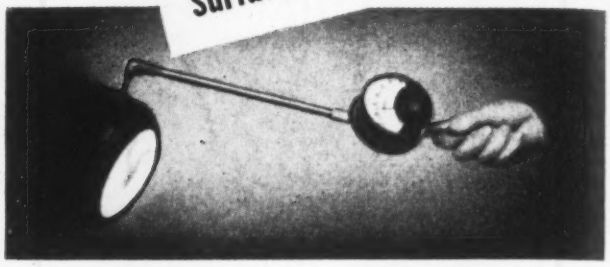
Place your orders now for Trimount absolute pressure gauges for *early delivery*. ASK FOR BULLETIN describing Trimount Red-Line Manometers.

TRIMOUNT INSTRUMENT COMPANY
523 South Plymouth Court ★ Chicago 5, Illinois

TRIMOUNT Red Line

MANOMETERS

Alnor
IMPROVED PYROCON
for quick accurate surface temperatures

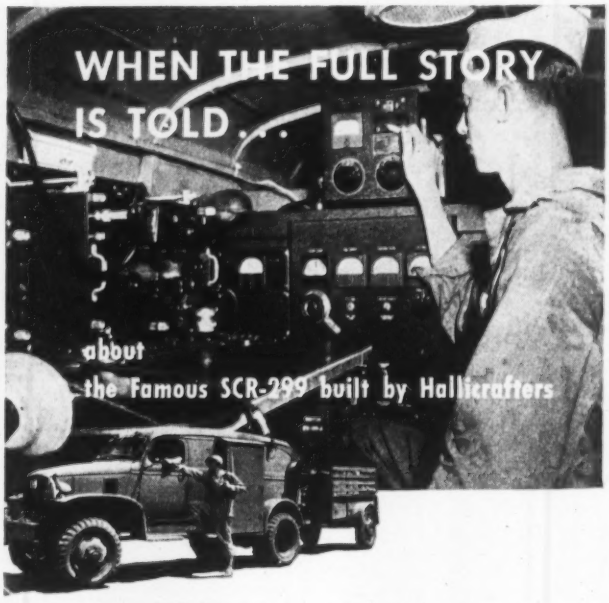


● The *Alnor* Pyrocon is a convenient all-purpose surface temperature pyrometer ideally suited to a great variety of industrial plant needs.

Accurate temperature readings are obtained in a few seconds of plastic materials, liquids, oils, and similar materials, and flat or curved, stationary or moving surfaces.

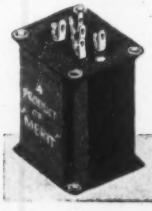
The rugged, shock-resisting movement is used with any one of eleven types of thermo-couples, interchangeable without adjustment or re-calibration. Choice of rigid or flexible arms, or both, instantly interchangeable. Built in several standard ranges, 0-300 deg. F. to 0-1200 deg. F. Write for Bulletin 3511 giving complete description.

Illinois Testing Laboratories Inc.
142 West Hubbard Street Chicago, Illinois



Since 1924

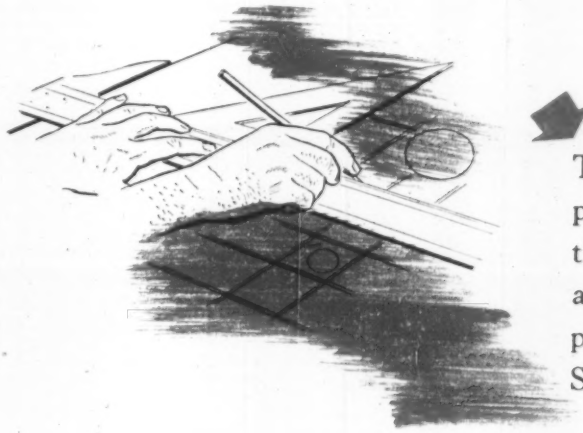
MERIT will take justifiable pride in its manufacture of precision parts for this miracle mobile unit which has contributed so much to the victories of our armed forces, and gives but a glimpse now of the limitless post-war future.



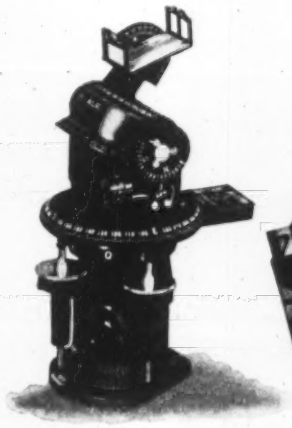
Now manufacturing for every branch of the Armed Services, enlarged facilities enable us to offer prompt shipment on priority orders.

Transformers–Coils–Reactors–Electrical Windings of All Types for the Radio Trade & other Electronic Applications.

MERIT COIL & TRANSFORMER CORP.
311 North Desplaines St. CHICAGO 6, U.S.A.

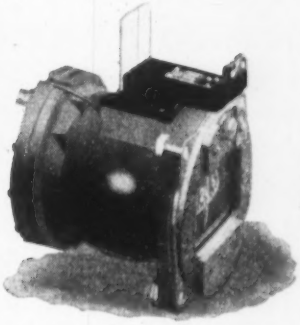


These are products made by our company for war-time aircraft. Because they are typical of American enterprise and engineering they are well-made, precise, and highly useful to the Armed Services.

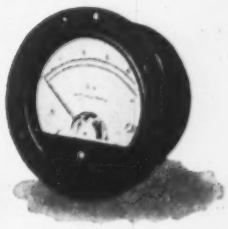


ASTRO COMPASS

BOMB RELEASE SWITCHES



COMPASS SWINGING SIGHT



ELECTRICAL INDICATING INSTRUMENTS

BUT...

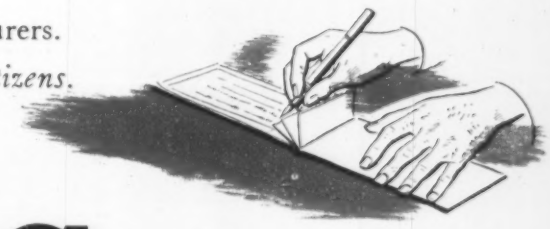
Let's take that for granted. Why shouldn't we be able to produce fine weapons in a nation that's filled with good materials, splendid machinery, skilled hands, and fine minds?

The question is—have each of us the spirit that goes a long step beyond mere manufacture—the spirit to build weapons and then *pay for them* with our purchases of war bonds?

That's the measure of our patriotism.

To *build* for Victory is our duty as manufacturers.

To *save* for Victory is our responsibility as *citizens*.



The W.W. **BOES** *Company, Dayton, Ohio*

MANUFACTURERS OF ELECTRICAL AND NAVIGATIONAL INSTRUMENTS FOR AIRCRAFT

THE *Telechron* MOTOR

REG. U. S. PAT. OFF.

IN WAR INDUSTRY

• Self-starting, synchronous Telechron timing motors are used by most American instrument makers and are serving virtually every war industry today.

• There are good reasons why. The motors are small, strong, accurate. They're available from 12 to 250 volts, and from 1 to 1800 R.P.M. They are easily adapted to almost any controlled frequency circuit and any industrial application, including:

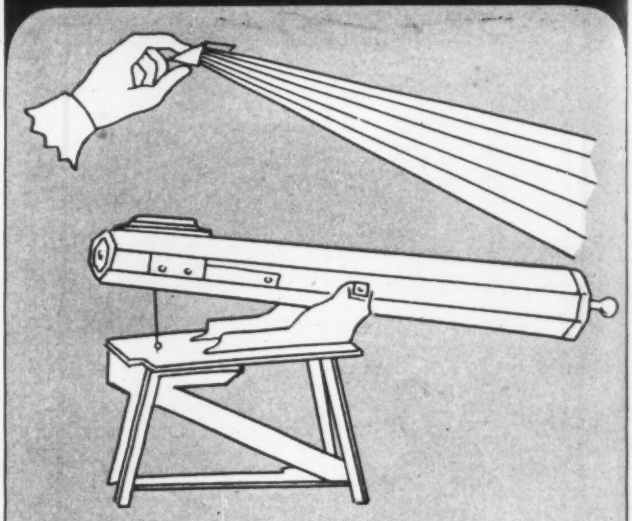
TIMING	SIGNALING
CONTROLLING	FIXED PROCESS CONTROLLING
METERING	MEASURING
RECORDING	GAGING
SWITCHING	REGULATION
CYCLING OPERATIONS	COMMUNICATIONS

• Telechron motors operate indispensable instruments of many kinds for the Army, Navy and Maritime Commission—for the Rubber, Chemical, Metal, Aviation, Petroleum, Power, Textile, Telephone and other industries.

• Naturally, we've learned a lot in the process of working out all these varied applications. Our experience and our information are at your service if we can help you in any way to speed up or improve your production for Victory.

WARREN TELECHRON CO.
Ashland, Mass.

in 1642-1727 Sir Isaac Newton



• Formulated the law of universal *gravitation* and laws of *motion*.

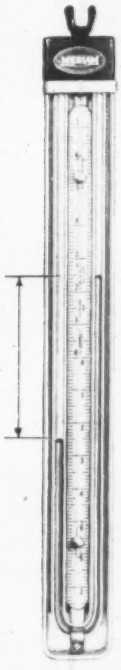
• Made notable contributions to the study of light, breaking up white light into the colors of the spectrum and recombining these into white light.

Today

MERIAM
MANOMETERS

★ Are used by scientists and physicists who are making great strides in the field of measurement. One of the very popular models is the U-type Clean-out Manometer for line pressures up to 100 lbs.

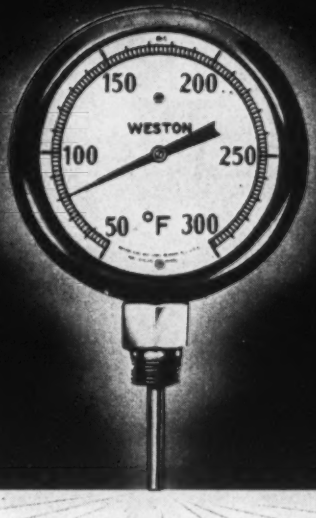
A wing nut permits the Manometer body and tube to be disconnected from the head—the tube cleaned with the brush furnished, and the instrument reassembled without disconnecting the head section from the piping. Available in standard ranges from 6" to 50".

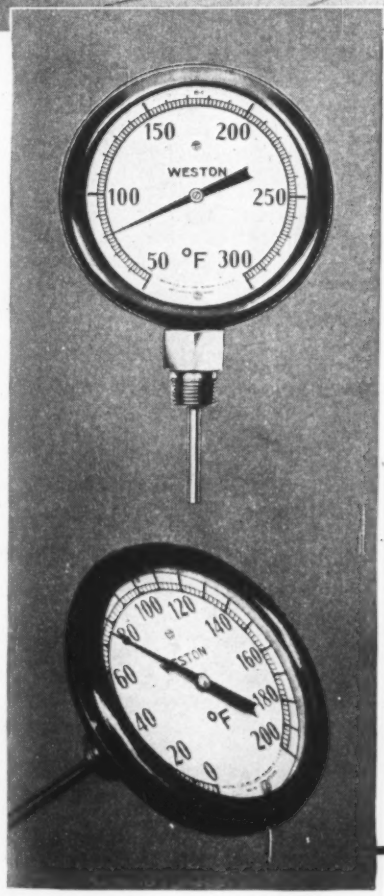


THE MERIAM COMPANY
Since 1911
1971 W. 112th St., Cleveland 2, Ohio

MERIAM
SINCE 1911
★
MANOMETERS, METERS AND GAUGES FOR THE ACCURATE MEASUREMENT OF PRESSURES, VACUUMS AND FLOWS OF LIQUIDS AND GASES

YOU CAN STAND BACK FOR A *Close-Up* READING!





...all-metal temperature gauges also provide the ruggedness...the long-life accuracy...essential in these busy days!

Every step . . . every minute . . is vital in this battle against time. Which explains why WESTON all-metal Temperature Gauges have been so widely adopted throughout industry. Readily mounted at any angle desired, their large gauge-type dials can be accurately read from a distance. In addition, their simplified all-metal construction . . . without liquids or gases . . . provides unusual ruggedness and eliminates the common sources of thermometer troubles. They stay "on the job" . . . maintaining their high initial accuracies . . . *far longer!* Available in sizes and stem lengths for most needs. Accuracy guaranteed within 1% over entire scale. Literature sent on request. Weston Electrical Instrument Corporation, 591 Frelinghuysen Avenue, Newark 5, New Jersey.

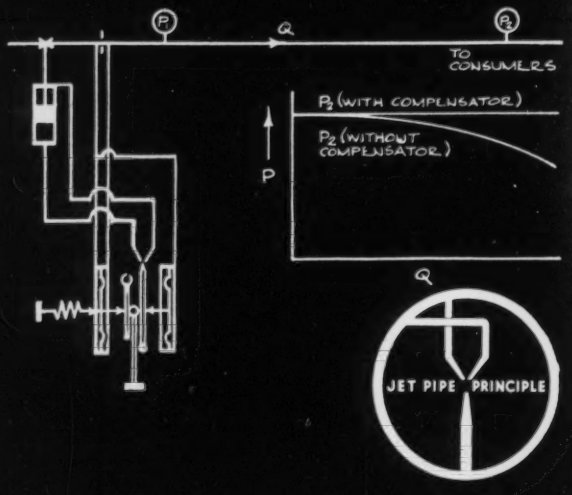
WESTON

ALL-METAL

temperature Gauges

PRESSURE CONTROL

With The Jet Pipe Principle



For any pressure or flow control problem requiring speed, stability and stamina, the jet pipe principle is the answer.

In the diagram is illustrated one of the many applications for an Askania regulator—that of remote pressure control. This and other problems of pressure and flow control are described in a new bulletin just published.

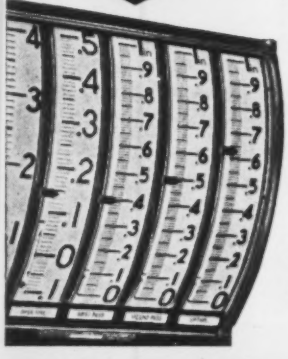
The bulletin also contains vital data relative to the sizing of the butterfly valves. Charts and tables show in a simple way how to determine butterfly valve sizes for all types of gases.

Write for bulletin 100.

ASKANIA REGULATOR CO.

1605 S. MICHIGAN AVENUE, CHICAGO

THIS DRAFT GAGE GAGES DRAFT



You know exactly how much draft—when you look at the Hays Draft Gage; *exactly*—not approximately.

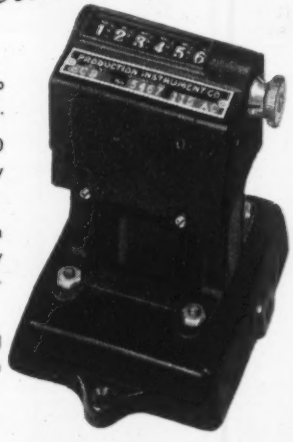
Amazingly tough yet soft and pliable, the colon leather diaphragm withstands constant flexing, yet sensitively records .0025 inch water. It lasts indefinitely—no effects from sudden overloads.

Its dependable accuracy quickly established the Hays Draft Gage as the standard of performance—it was the first of the dry type gages.

Write for Bulletin 40-294—gives you complete information.

The HAYS CORPORATION
COMBUSTION INSTRUMENTS AND CONTROL
MICHIGAN CITY, INDIANA, U.S.A.

Wizard Electric Counters



Count anything from shadows to box cars—parts, cans, cases, bottles.

Current draw only 4 Watts — 600 counts per minute—continuous duty coils — all working parts enclosed.

May be located at any distance from actual source of count. Actuated by any suitable switch, relay, or photo-electric unit.

Built for heavy duty industrial service. Quick deliveries on high priority orders.

Counting Problems Solved!

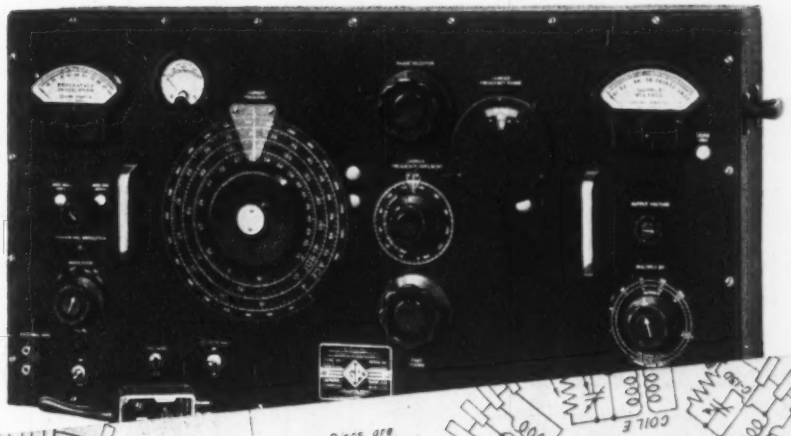
Princo Mechanical and Electric Counters are made in types and sizes to meet widely varying requirements. Our extensive experience is available to users in applying Counters. For suggestions just tell us what you want to do.

Complete Catalog mailed promptly on request.

Production Instrument Company

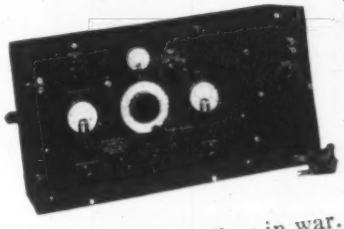
702 W. JACKSON BLVD. CHICAGO, ILL.

Manufacturers of Counting, Timing and Recording Devices



STANDARD-SIGNAL GENERATORS

by General Radio

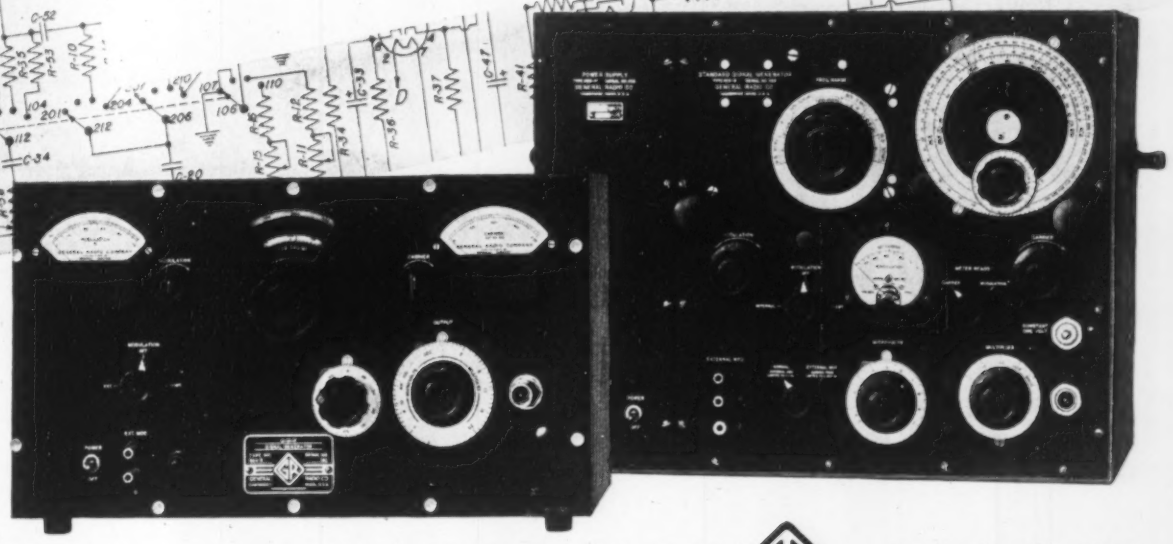


SINCE General Radio pioneered the first commercial standard-signal generator in 1928, it has been the aim of our design engineers to make available signal generators for testing all types of home, commercial and military receivers.

In addition to standard catalog models, many specialized instruments have been designed and built for the armed services, in peace time as well as in war.

Present designs collectively cover a frequency range of 300,000:1. While many of these are not at present available for general use, because of wartime secrecy requirements, they contribute to the stock of engineering design experience that will be applied to the production of commercial models after the war.

The country's leading radio receiver laboratories are equipped with General Radio signal generators, backed by 28 years' experience in building high-quality instruments.

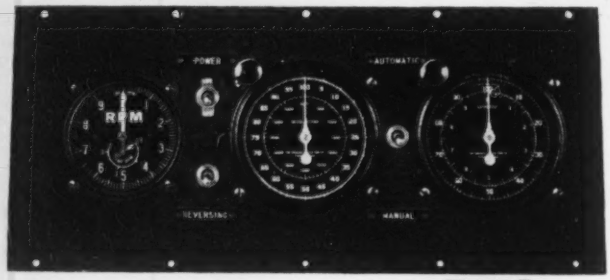


GENERAL RADIO COMPANY

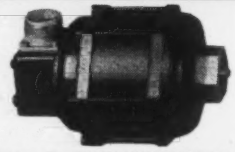
Cambridge 39, Mass.

NEW YORK 6 · LOS ANGELES 38

ANOTHER ACHIEVEMENT IN *Accuracy* BY STANDARD ELECTRIC TIME



TYPE SG
(SELF GENERATING)
CHRONOTACHOMETER



This new chronotachometer fills the need for a versatile and extremely accurate instrument for measuring speed and integrating revolutions and determining the fuel power, oil circulation, and developed horsepower of aircraft and other engines.

ITS FEATURES INCLUDE

an electric drive; a conveniently-mounted 3-phase generator providing positive indication for either direction of rotation; a 3-conductor cable between generator and two 3-phase receiving motors, which drive the tachometer and revolution counter units. The tachometer is a flight instrument of the sensitive type.

THE ACCURACY

of the new chronotachometer is as follows: Timer; to within .001 minutes per test run. Revolution Counter; to within ½ revolution per test run. Tachometer; to within 10 RPM throughout the scale range. Thus extreme accuracy of speed measurement may be obtained by prolonged integration of time and revolutions.

Automatic 1/10th minute integration (Rapid Speed Check) is included.

Address I-9

THE STANDARD ELECTRIC TIME CO.
"Split-Second Measurement by Standard"
SPRINGFIELD, MASSACHUSETTS

ACCURATE AUTOMATIC CONTROL
The Key to Successful Mass Production
MISTAKES in mass production are costly. All factors must be right the FIRST time.
Accurate automatic control with potentiometric instruments, of operations involving temperature or p H, is the key to success. For a quarter century most of these instruments have depended on Eplab Standard Cells for accuracy.
These cells are a "yardstick" for translation of voltage to temperature or p H. The first commercial cells of their type in America, constantly improved by research, they are "as standard as sterling".
THE EPPLEY LABORATORY, INC.
SCIENTIFIC INSTRUMENTS
NEWPORT, RHODE ISLAND, U. S. A.
EPLAB Standard CELLS
FOR POTENTIOMETRIC INSTRUMENTS
"As Standard as Sterling"
Specify EPLAB Standard CELLS for YOUR POTENTIOMETERS

Wherever there's production to be counted . . . you'll need

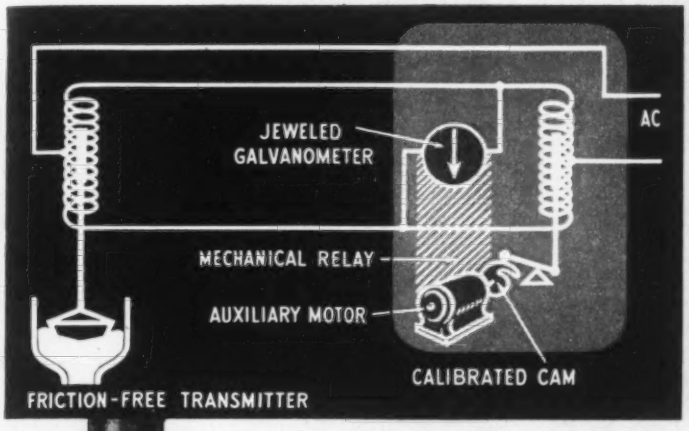
PRODUCTIMETERS

They're available in several styles and models: Stroke, Rotary, Predetermined, Yardage, Lumber, Wire Measuring, Conveyor and Electric. They're ruggedly built for hard usage, extreme accuracy and dependability . . . speeds 400 to 5000 counts per minute . . . capacities 3 to 8 figures.

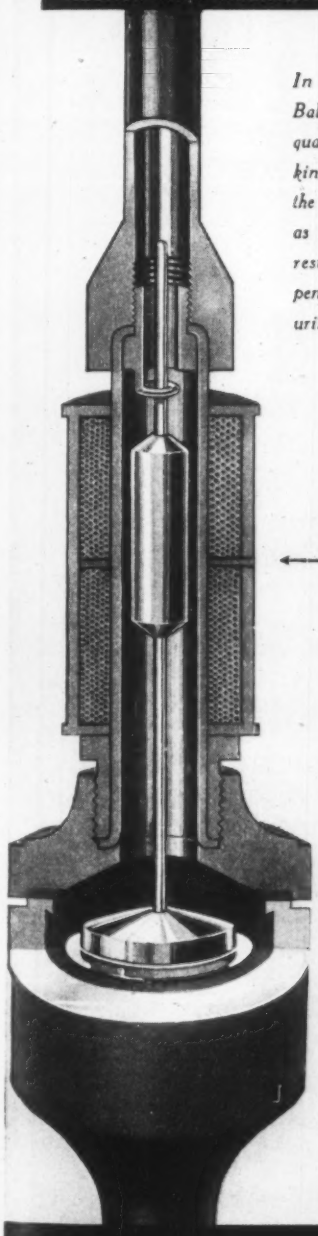
If you have a counting problem, write us. Our advice and recommendations are backed by 64 years' experience in the exclusive manufacture of counting and measuring devices.

Bulletin No. 100 on request.

DURANT MANUFACTURING COMPANY
1914 N. Buffum Street, Milwaukee, Wis. — PRODUCTIMETERS (THE SPEEDOMETERS OF INDUSTRY) — 194 Eddy Street, Providence, R. I.



In the Cochrane Flow Meter, the Null or Zero Balance principle is employed, balancing the unknown quantity by adjusting a known quantity of the same kind. A highly sensitive detector is used to determine the point of balance. A friction-free transmitter serves as a pilot for an external motor drive. The motor restores the bridge to balance and operates recording pen, indicating pointer, and integrator. The measuring circuit is relieved of all work.



←It Floats!

The Cochrane Friction-Free Manometer

- No Bearings
- No Stuffing Box
- No Electric Contacts
- No Solenoid "Reaction"

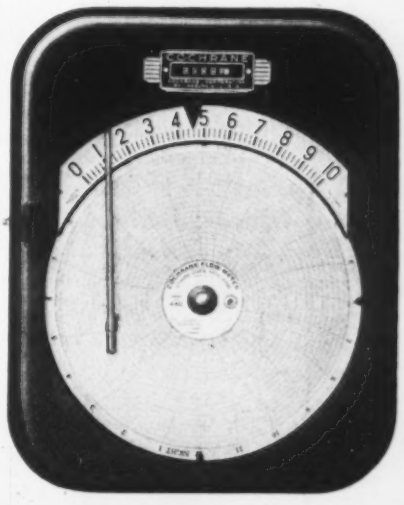
This sensitive float acts as a pilot for the auxiliary motor drive, which operates with high and equal power throughout the entire scale.

7 Range Capacities Available in Cochrane Flow Meters.

The capacity of a Cochrane Flow Meter may be altered to meet varying conditions in 15 minutes' time. Two styles of transmitter are available, one of which provides five changes of manometer tube, ranging from 18 inches water differential through 42, 75, 117 to 169. The other style transmitter provides for seven ranges, five as above plus two additional of 230 and 301 inches water differential.

Write for Publication 3010

COCHRANE CORPORATION
3120 N. 17th St., Phila. 32, Pa.



COCHRANE FLOW METERS

BD-72

● Military authorities doubt that the war will be won by any secret super weapon. They count on fighting efficiency developed out of many small things — advantages gained from foresight and painstaking attention to detail.

For example, take the BD-72 portable military switchboard developed at *Connecticut,* in cooperation with Signal Corps engineers. It has many features we can't tell you about, but we can say that the BD-72 was designed to save space, to get into operation faster, to stand a lot of rough usage under fighting conditions. Small things? Not if its small size permitted getting one more machine gun aboard the truck. Not if it helps "get the message thru" even *seconds* sooner. Small things sometimes loom large when the job is to get the jump on the enemy.

All over America, the doom of the Axis is being made more and more certain by giving the fighting men of the United Nations better fighting tools. The birth of better ways of doing things *after* the war, is an all-important by-product of this effort. *Connecticut Telephone & Electric* is an excellent source of ideas for developing your postwar product or manufacturing methods, if they involve communications, or the engineering and manufacture of precision electrical devices.

CONNECTICUT TELEPHONE & ELECTRIC DIVISION

GREAT AMERICAN INDUSTRIES INC.

MERIDEN, CONN.

For the second time within a year, the honor of the Army-Navy Production Award has been conferred upon the men and women of this Division.

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Inspection of hard-to-get-at places now made certain and accurate with the help of

WAPPLER INDUSTRIAL TELESCOPES

Write for our Booklet: "Precision Instruments for the Exacting Inspection of Internal Surfaces."

For prompt action and our recommendations, include drawing of part to be inspected, or preferably the part itself.

A.C.M.I. TRADE MARK

Industrial Division

AMERICAN CYSTOSCOPE MAKERS, Inc.

FREDERICK C. WAPPLER, Pres.

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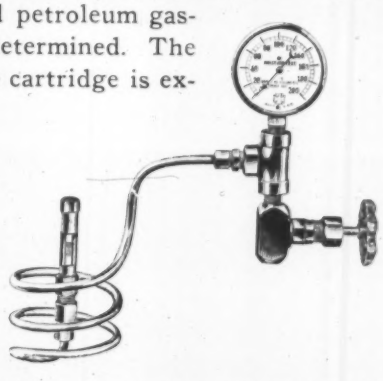
SERVICE ACCURACY THE R.S.Co. TULSA

Testing Equipment for Liquefied Petroleum Gasses

MOISTURE TESTER

By color changes in an indicating cartridge the moisture content of propane, butane and other liquefied petroleum gasses is easily determined. The color sensitive cartridge is exposed to the gas under actual conditions of storage, giving accurate results.



For other gas testing instruments, Catalog No. 26A.

THE REFINERY SUPPLY CO.

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To anticipate the exacting demand of industry's future instrumentation, Brown and Minneapolis-Honeywell engineers have assumed the obligation of leadership in pioneering new developments for the measurement and control of industrial processes.

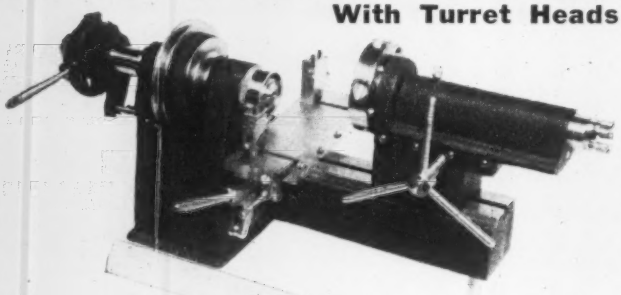
THE BROWN INSTRUMENT COMPANY, 4482 WAYNE AVENUE, PHILADELPHIA, PENNSYLVANIA
DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR CO.
MINNEAPOLIS, MINNESOTA, AND 119 PETER STREET, TORONTO, CANADA
Wadsworth Road, Perivale, Middlesex, England: Nybrokajen 7, Stockholm, Sweden

Instruments by **BROWN** *and Controls by*

MINNEAPOLIS-HONEYWELL

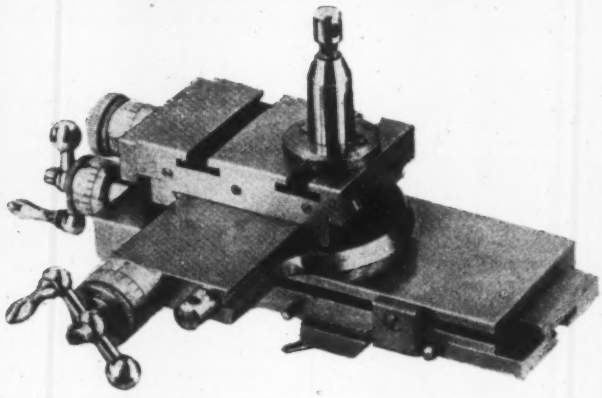
IMMEDIATE DELIVERY . . .

INSTRUMENT PRODUCTION LATHES
With Turret Heads



Two Sizes—3/16" and 1/2" Bar Capacity
9" Bed and 4" Swing
Both Sizes Have Lever Collet Closers

COMPOUND SLIDE REST



English or Metric Screw Feed
Lever Attachment Available

For Precision Work on

AIRCRAFT INSTRUMENTS · RADIO INSTRUMENTS · CAMERA INSTRUMENTS · METER INSTRUMENTS
ELECTRICAL INSTRUMENTS AND TIMING DEVICES

R. P. GALLIEN

AIRCRAFT INSTRUMENT PRECISION EQUIPMENT . . . TOOLS AND SUPPLIES

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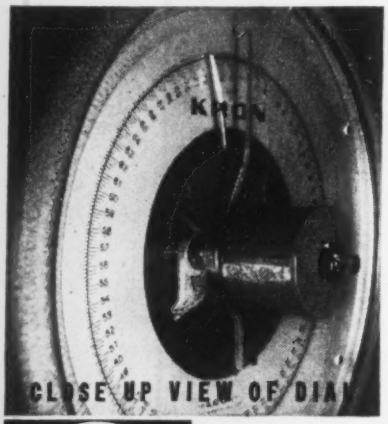
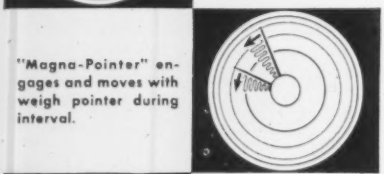
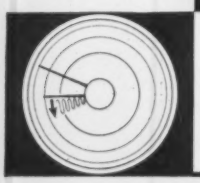


"Magna-Pointer" held at zero before timing interval.



"Magna-Pointer" engages and moves with weigh pointer during interval.



"Magna-Pointer" instantly stalls at end of timed interval.

KRON

Announces

ELECTRO-MAGNETIC POINTER

For Industrial DIAL SCALES and precision force INSTRUMENTS

Can be attached to the weigh pointer or detached and held stationary at any instant during a weighing operation, or force measurement without affecting the accuracy of the scale instrument.

Can be operated manually or by remote timer or switch gear.

Permits accurate "rate of flow" indication for timed intervals. It is a perfect automatic tare device for barrel, box or bag filling. It is invaluable for mixing chemicals or fluids.

KRON INDUSTRIAL DIAL SCALES

"Engineered for the Job"

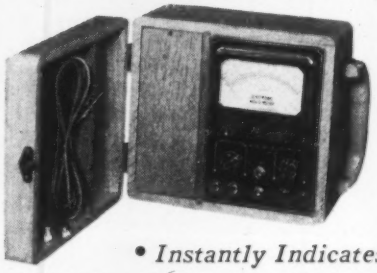
The KRON Co.
Bridgeport 5, Conn.

Model 610-B

MEG-O-METER

COMBINATION
INSULATION TESTER
AND
RESISTANCE METER

3 RANGES:
0—20,000 OHMS
0—2 MEGOHMS
0—200 MEGOHMS



• *Instantly Indicates the Exact Leakage of All Insulation from Zero up to . . .*

200 MEGOHMS AT A TEST POTENTIAL OF **500 VOLTS D. C.**

FEATURES:

★ **NO HAND CRANKING** the 500 Volt Potential is made instantly available by simply throwing the toggle switch.

★ **DIRECT READING** all calibrations printed in large, easy-to-read type. In addition, the Megohm Scale is subdivided into BAD, DOUBTFUL and GOOD sections. The BAD section is printed in red.

★ **Panel is of solid Bakelite engraved by new "cut-in" process.**

★ **METER MOVEMENT** a large 4½" 0 to 200 Microampere sensitive meter guarantees extremely accurate reading on all ranges.

Model 610B comes housed in a beautiful, hand-rubbed Oak cabinet. Complete with cover, self-contained battery, test leads and instructions. Sizes: 9½" x 8½" x 6". Shipping weight 16 pounds.

Price **$62.50**

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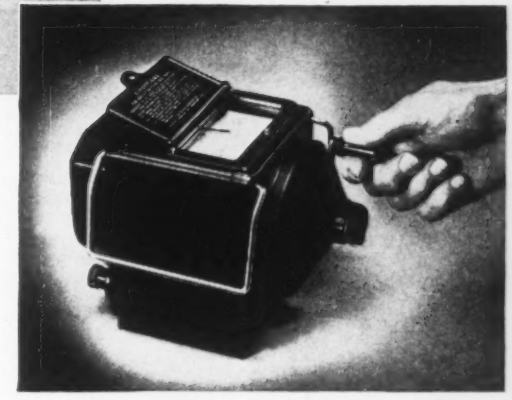
READY FOR USE



*THE NEW "MEGGER"**
INSULATION TESTER . . .

a worthy addition to the famous "MEGGER" family!

MADE IN U.S.A.

- HAND-CRANKED GENERATOR
- DIRECT-READING OHMMETER
- SIMPLE
- RUGGED
- RELIABLE

*Trade Mark Reg. U. S. Pat. Off.

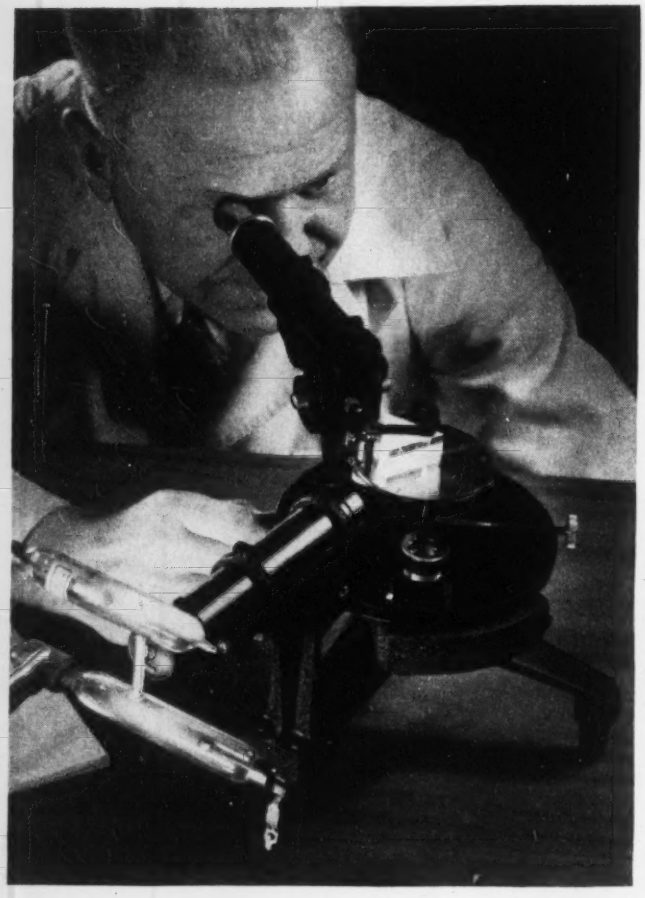
With our Philadelphia factory now in full production, your needs for "Megger" Insulation Testers can soon be met.

Our new U. S. models are of the same general design and are similar in every way to our well-known "Meg" and "Super-Meg" Insulation Testers, except that they are housed in plastic molded cases instead of aluminum. All internal parts are made to the same proven design and specifications as the "Meg" instruments,—without compromise or substitution of materials. The cases are of high impact strength plastic,—one of the strongest, toughest molding materials available.

The entire instrument is built in our own plant by men and women who know how to make fine instruments. Our production is independent of the products of other instrument manufacturers.

We are fully confident that you will find these new Insulation Testers worthy members of the famous "Megger" family, and we invite your orders for them. At present we are offering ranges up to 100 and 1000 megohms with 500-volt generators. We continue to supply various other types and ratings of "Megger" instruments as formerly. Write for new descriptive Bulletin 1735-I.

JAMES G. BIDDLE CO. · 1211-13 ARCH STREET · PHILADELPHIA 7, PENNA.



Looking Forward

Wartime achievements in science are developing an era of progress which challenges the imagination.

All that Spencer is doing now—producing microscopes, periscopes, telescopes, aircraft and anti-aircraft gunsights, prism binoculars, azimuth instruments for directing artillery fire, tank sights, telescopic alidades for navigation, projectors for instruction—will reap peacetime rewards in advanced knowledge, better manufacturing techniques.

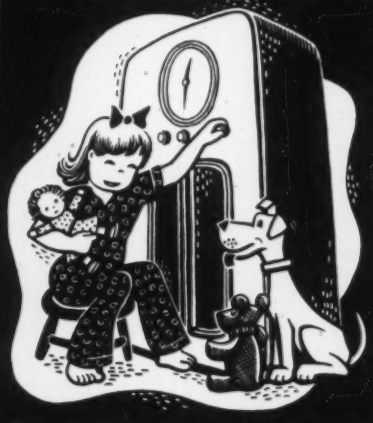
At the war's end, Spencer will be ready to serve scientific optical needs on a far broader scale than ever before.

Optical instruments are so vital to war and public health that the nation's needs absorb practically all of Spencer's greatly increased production.

ARMY E NAVY

Spencer LENS COMPANY
BUFFALO, NEW YORK
SCIENTIFIC INSTRUMENT DIVISION OF
AMERICAN OPTICAL COMPANY

RADIO STATIONS USE
PRECISION THERMOSTATS



TO GIVE YOU BETTER RECEPTION

PRECISION THERMOMETER AND INSTRUMENT COMPANY
PHILADELPHIA, PA.

PRECISION
INSTRUMENTS FOR INDUSTRY

FOR SMALL PARTS
TOO DIFFICULT TO CLEAN
MANUALLY or by ANY OTHER METHOD

Component parts of radio tubes are small, delicate, numerous, presenting a tough cleaning problem. Increasingly L & R is specified and is achieving gratifying results. With such a record, L & R is worthy of your inquiries. *WRITE for complete catalog data.* In one unit, L&R CLEANS • RINSES • POLISHES • DRIES instruments, meters, gauges—all types of small metal parts, quickly, easily.

L & R PRECISION CLEANING EQUIPMENT
USED BY MORE THAN 200 INDUSTRIES
L & R MANUFACTURING COMPANY
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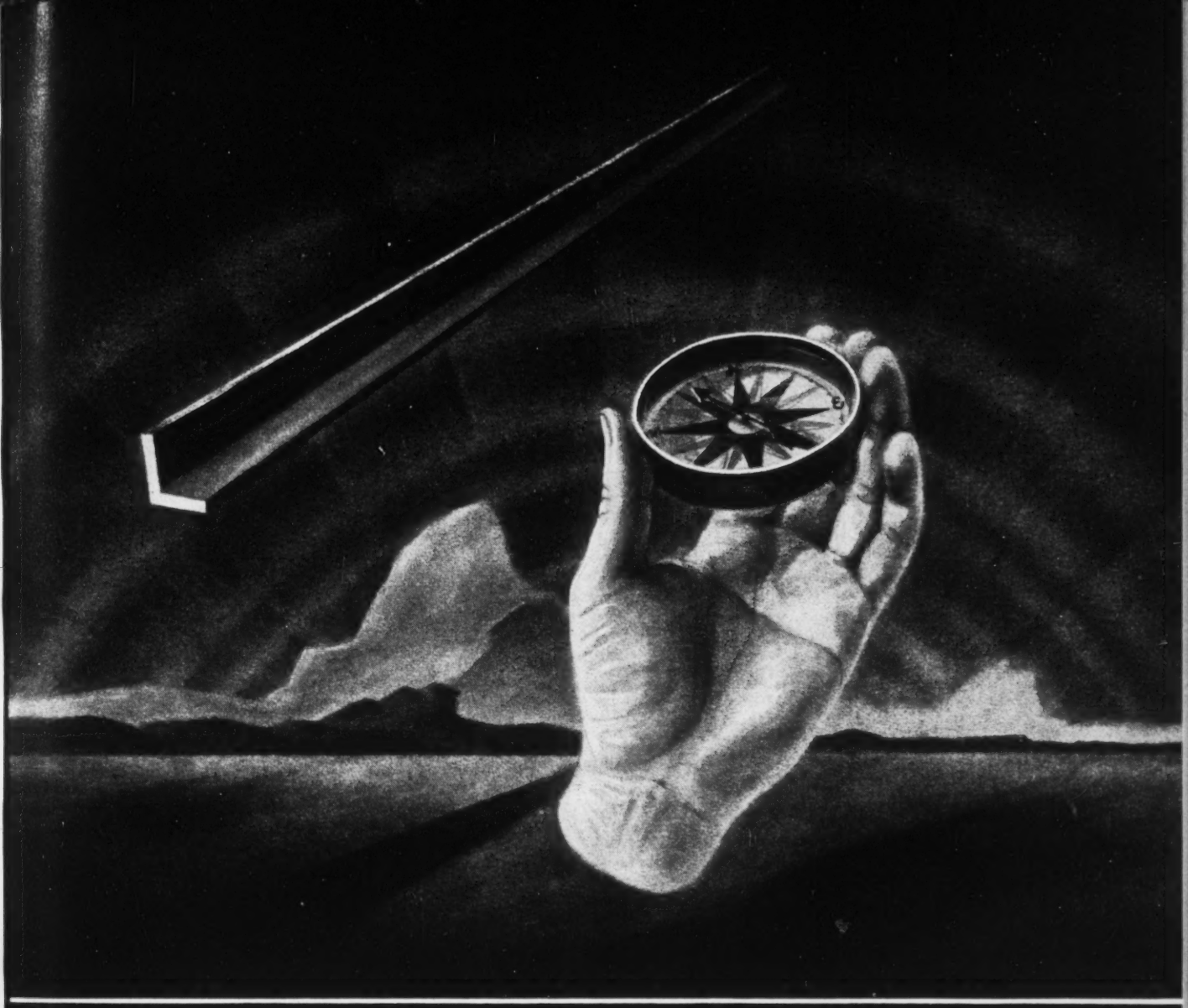

When a compass will not show you the way to go home

RESIDUAL MAGNETISM, in plane parts and members, too often causes compass deflections that set a pilot off his course. Magnetic fields, to be properly dealt with, must be measured—their effects at compass locations accurately determined.

WAUGH MAGNETOMETERS provide a practical means for measuring residual magnetic fields accurately and instantaneously. Deflections can be read in milligausses or degrees. Polarity is also indicated. MODEL MW-2 is for inspection of airplane materials and parts. MODEL MW-3, especially fitted for use in checking compasses in completed planes, speeds and simplifies the important operation of swinging planes on the compass rose. MODEL MW-4 has a miniature pick-up unit that can be substituted for the compass in the instrument panel.

Send for descriptive literature.

MAGNETOMETER
WAUGH — MW 2
Materials inspection type.

WAUGH *Laboratories*

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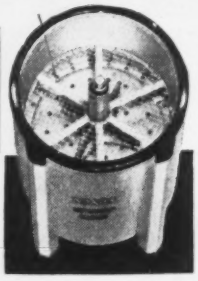
PRECISION NAXON BUILT **PORTABLE ELECTRIC INSTRUMENT WASHER**

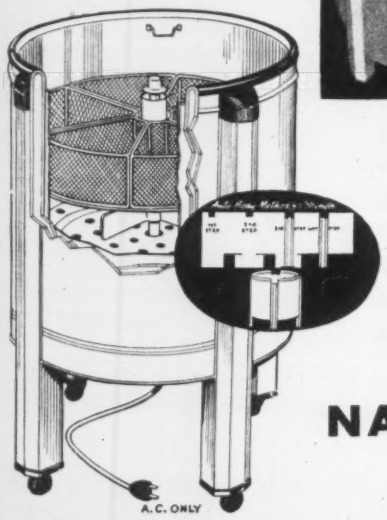
Filings, burrs, etc., from brass or copper screw machine parts salvaged in sediment trap will soon pay for this machine.



Use your own proven solvent or cleansing liquid such as Oakite, soap, powder solution, carbon tetrachloride, trichlorethylene, etc.

Only $65 Complete with Trays and Cover

Same instrument with thermostatically controlled heating element for use with low-cost solutions where constant temperature is required, Model C742-B, **$85.00.**



THOROUGHLY AND SAFELY CLEANSES THE MOST DELICATE MECHANISMS AND SMALL PARTS

1. No Abrasions! No Bumping! No Scratching! No Tumbling! Absolutely no abuse because there is no moving of the most delicate parts or mechanisms.

2. Cleansing liquid circulates through complex and odd shaped instrument assemblies—work remains stationary.

3. Keeps disassembled parts together; no mixed or missing parts.

4. Work comes out like new.

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6. Drain well at bottom for dirt elimination.

WRITE FOR LITERATURE

AIRCRAFT INSTRUMENT DIVISION

NAXON UTILITIES CORPORATION

Engineers and Manufacturers of Precision Electrical Devices Since 1922

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IRC makes resistor units of more types, in more shapes, for more applications than any other manufacturer in the world.

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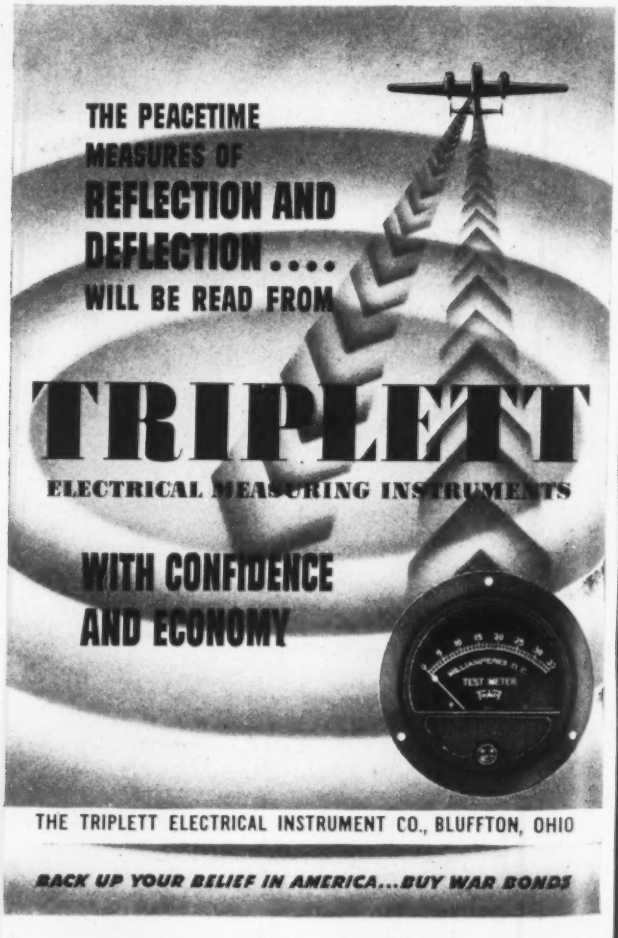

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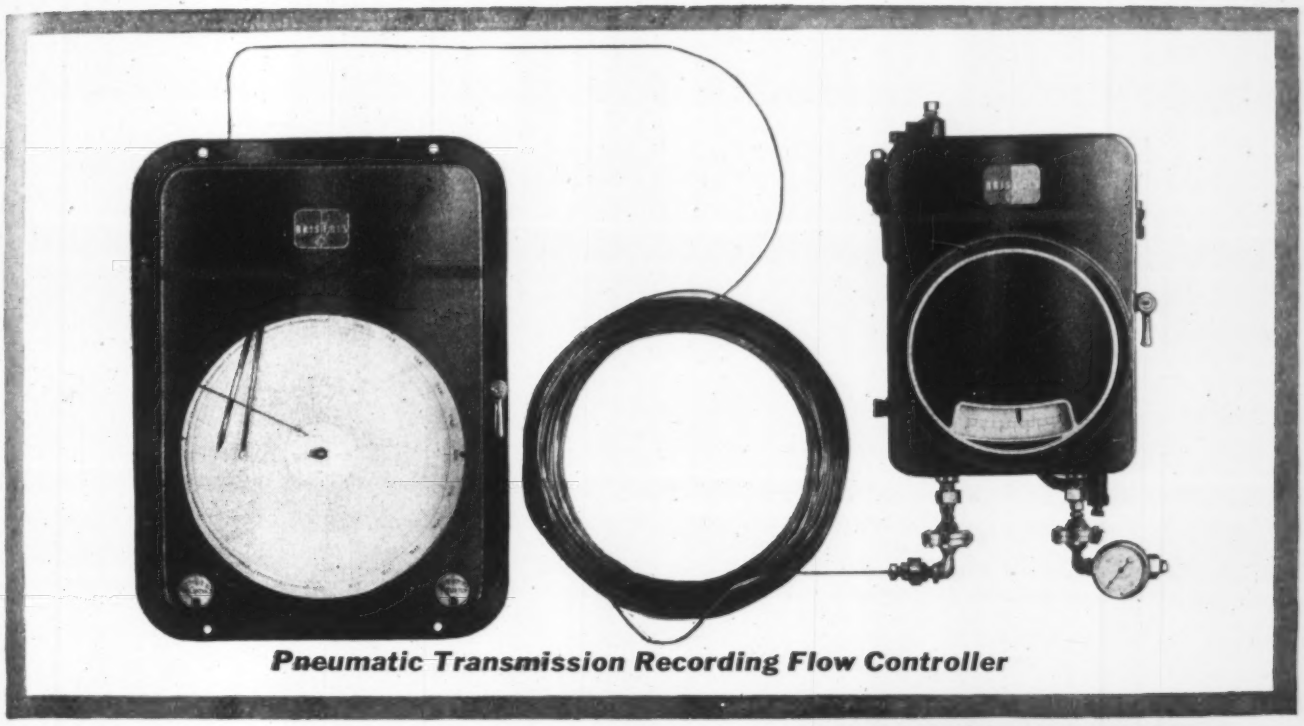
BACK UP YOUR BELIEF IN AMERICA...BUY WAR BONDS



Pneumatic Transmission Recording Flow Controller

PROMPT DELIVERY SCHEDULES

ON FLOW METERS AND FLOW CONTROLLERS

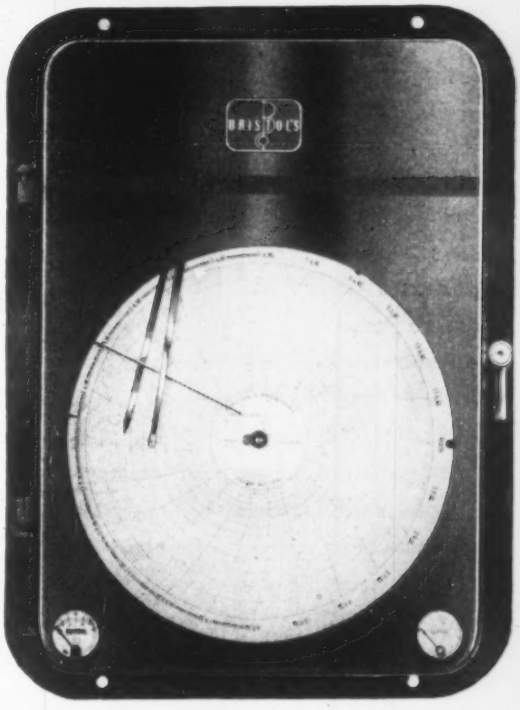
For High Octane Gasoline, Synthetic Rubber and Chemical Programs

The Bristol Company, after making a careful study of probable requirements for flow meters and controllers, has expanded its manufacturing facilities and has set up a planned production schedule which will greatly facilitate delivery.

Models now being produced on a new delivery schedule, include recording flow meters, recording flow controllers and pneumatic transmission flow meters — both recorders and controllers. You can now be more certain of getting these models *in time* to break that meter-bottleneck in your plant!

These models are briefly described in Bulletin F 1601, a data sheet for your files. Write us for complete information.

Bristol instrument application engineers are available, without obligation, to assist in planning proposed installations. This service is particularly helpful during the war period because correct planning and accurate specifications save delivery and installation time and make for successful operation.



Mechanical Recording Flow Controller

THE BRISTOL COMPANY, WATERBURY, CONNECTICUT

The Bristol Co. of Canada, Ltd.
Toronto, Ontario

Bristol's Instrument Co., Ltd.
London N. W. 10, England

Engineers Process Control for Better Products and Profits

AUTOMATIC CONTROLLING AND RECORDING INSTRUMENTS

FLOW METERS — QUICK DELIVERY COUPON

THE BRISTOL COMPANY
113 Bristol Road, Waterbury, Conn.

Please send me information about Bristol Recording Flow Meters and Flow Controllers on improved delivery schedule plan.

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COMPANY .....

ADDRESS .....

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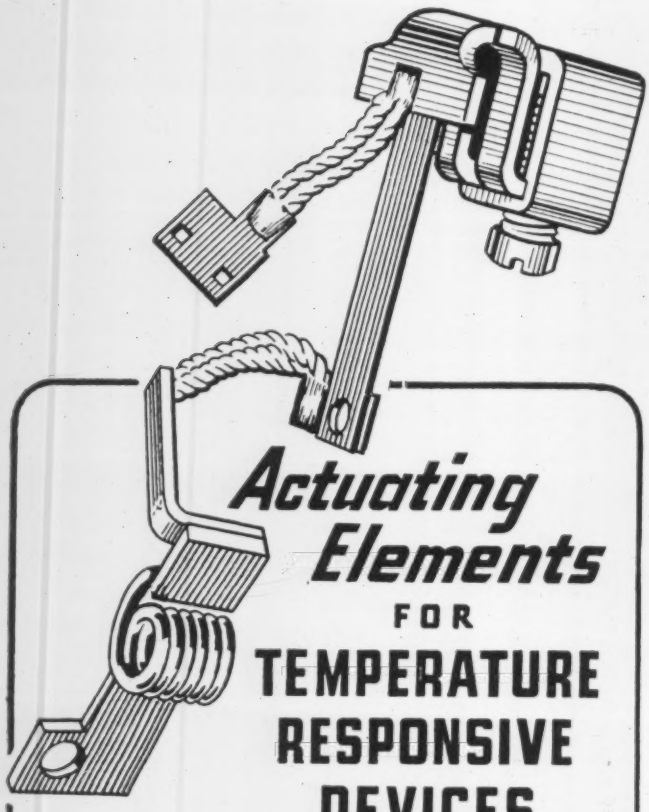


Actuating Elements FOR TEMPERATURE RESPONSIVE DEVICES

Thermostatic Bimetals of all types, in every practical shape, engineered to meet your specific requirements. Chace Thermostatic Bimetals in combinations of nickel-iron, nickel-chromium-iron, copper-nickel, copper-manganese and manganese-nickel alloys are regularly being used as the actuating elements in vital control instruments for aircraft, tanks, trucks, cars, jeeps as well as for every other type of temperature responsive device. To meet every possible demand Chace utilizes 25 different alloys to produce 35 different types of Thermostatic Bimetal.

Chace Thermostatic Bimetals are sold in shapes ready for assembly, also completed assemblies with terminals attached. Data sheets and engineering assistance cheerfully furnished on request.

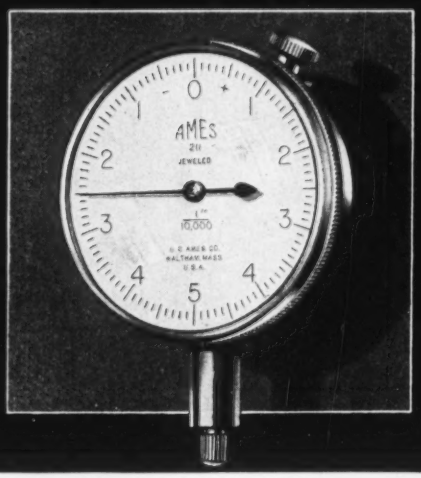
W.M. CHACE CO.

Manufacturers of

Thermostatic Bimetals and Special Alloys

1609 BEARD AVE • DETROIT 9, MICH.

AMEs *Hundred Series* DIAL INDICATORS



Made to A. G. D. specifications in four sizes with fourteen different dial numberings indicating thousandths, half and tenths of thousandths inches. Plain or jewel bearings. Shock absorbers for all models

Send for new catalog No. 52

B. C. AMES CO., WALTHAM, MASS.

LABORATORY GRADE

ENGRAVED STEMS WHITE BACK

★ These trustworthy thermometers for general laboratory projects are available in centigrade and fahrenheit calibrations. Stems 6-7½ mm. are individually gauged for uniformity. Each thermometer carefully packed and guaranteed to reach you in perfect condition.

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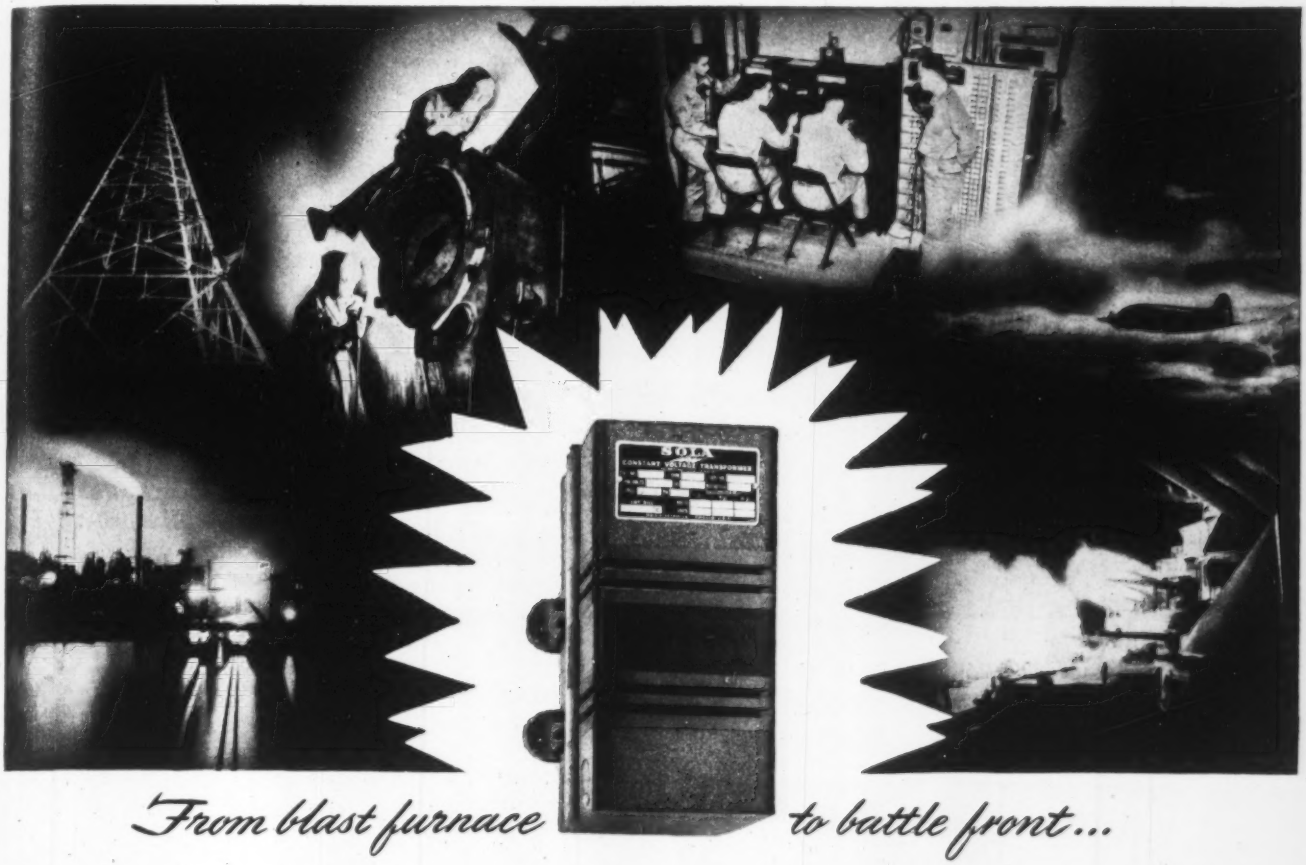
H-B INSTRUMENT COMPANY

INCORPORATED

2525 N. Broad St., Philadelphia, Pa.

PRECISION SCIENTIFIC INDUSTRIAL INSTRUMENTS

H-B THERMOMETERS



From blast furnace to battle front...

Constant Voltage guides the Tools of War

NEVER before in the history of warfare has precision production been so important as it is today. From the trigger group of an M-1 rifle to the fire control of a 16-inch battery, split-hair tolerances are demanded in millions of intricate munitions parts. Producing to uncompromising standards requires the finest type of machine tools ever designed—operated at a constant level of electric power.

But *constant voltage* is almost non-existent on today's overcrowded power lines. Wartime consumers are busier. Huge volumes of electrical energy are being intermittently used and released. Heavy sags and destructive surges inevitably occur. For that reason, manufacturers in every field are stabilizing power themselves with SOLA CONSTANT VOLTAGE TRANSFORMERS.

Sola "CVs" equalize voltage sags and surges, absorb variations as great as 30%, feed a controlled flow of power to machines. And they protect the *very life* of sensitive instruments and electronic tubes.

Engineered for long, trouble-free service, Sola "CVs" are instantaneous in action, without moving parts, self-protecting against short circuit. They have a place on *your* production lines —the life lines of American victory.

Note to Industrial Executives: *Sola "CV" transformers are available in standard 10VA to 15KVA units. Special units built to specification. Ask for bulletin GCV-74*

SOLA Constant Voltage Transformers

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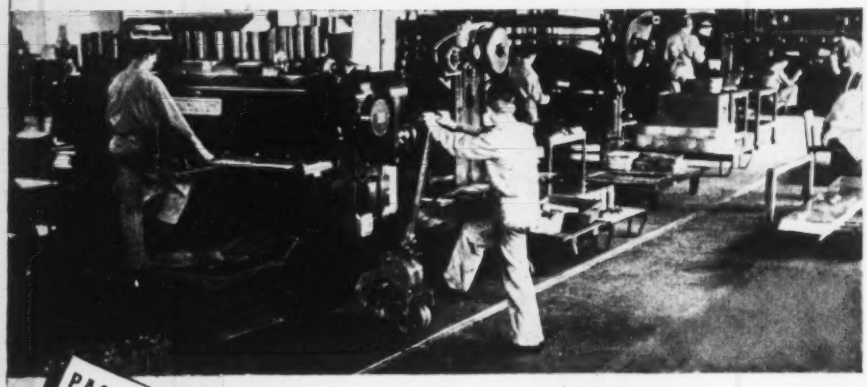

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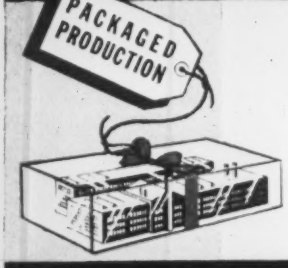

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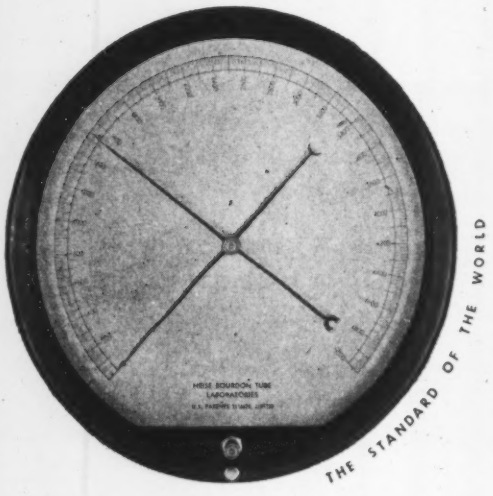

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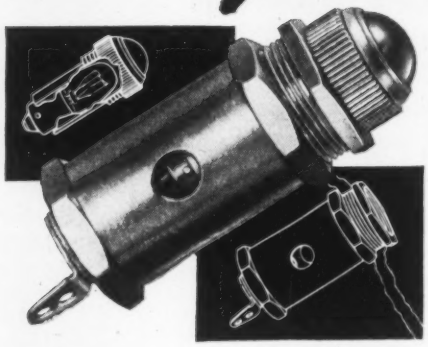

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EXCLUSIVE FEATURES

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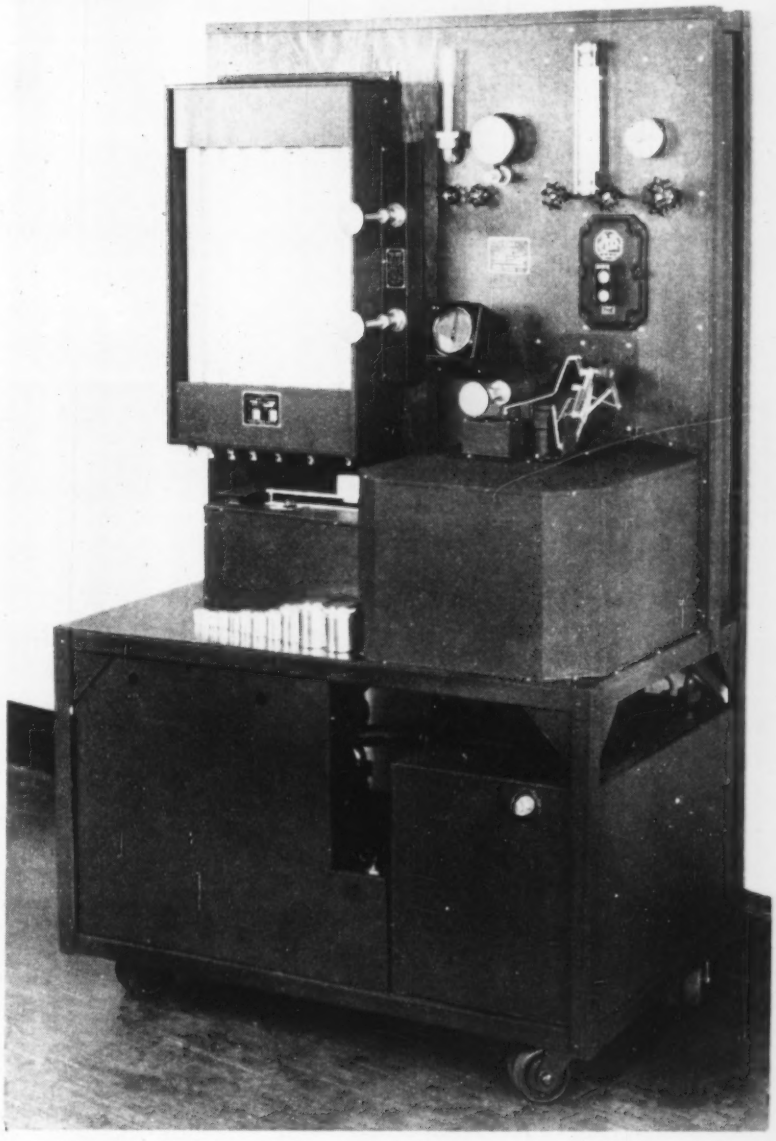

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1590-218	16.	20.	15.	
1590-219	18.	20.	17.	
1590-220	18.	20.	18.	
1590-221	18.	23.	20.	
1590-222	18.	25.	22.	
1590-223	18.	25.	22.	
1590-224	18.	25.	22.	
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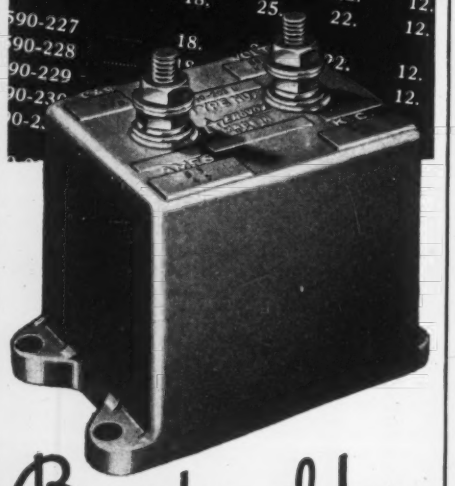

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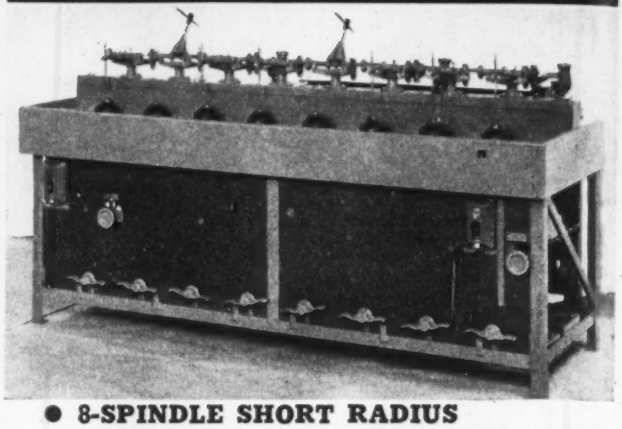

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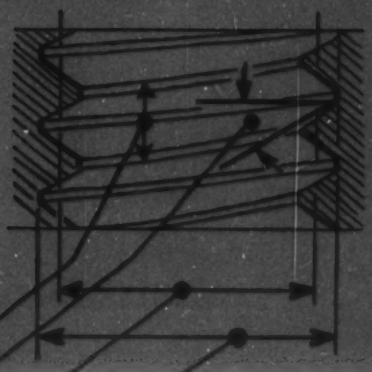

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VARD THREADED PLUG GAGES

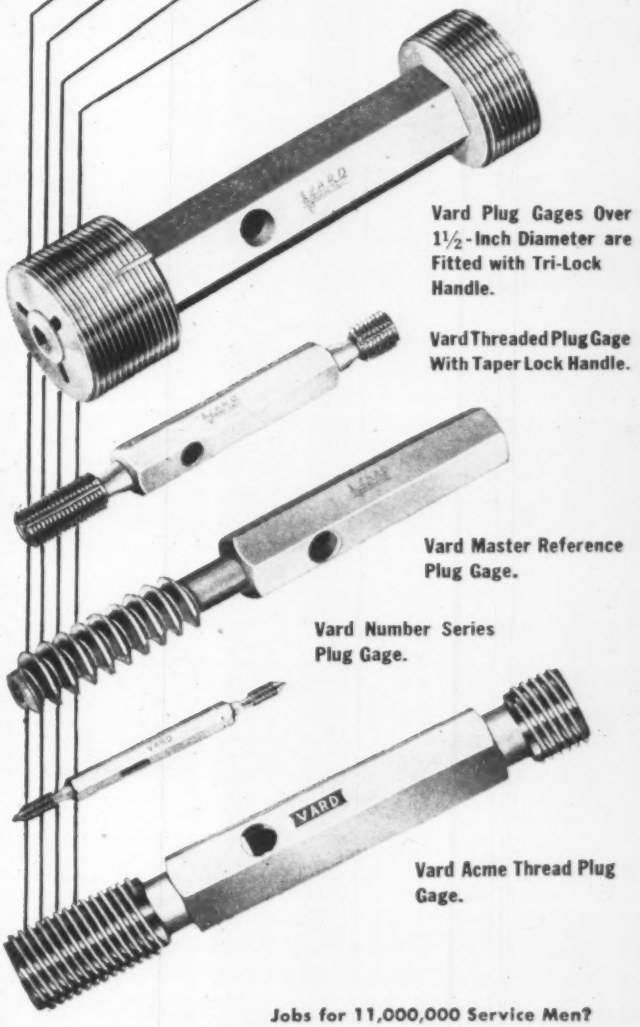
Now is the time for greatest war effort. Cut down on your rejections and speed production by use of VARD threaded plug gages.

Use these accurate, long wearing, working gages to quickly inspect internal threads. Use VARD master reference gages to check wear on your ring gages.

VARD threaded plug gages are made in gage sizes from No. O-80 NF. to 12″ diameter, and in NC., NF., NS., Metric, Acme and special pitches, in both right and left hand threads.

VARD plug gages are ground from special-alloy, long wearing steel, and are hand finished and inspected with the most modern and exact mechanical and optical equipment.

They may be ordered as complete units consisting of a "GO" member, a "NO GO" member, and a handle, or any member may be obtained separately.



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Jobs for 11,000,000 Service Men?

Some day, maybe soon, men will pour out of the Army — looking for work. Can plants now loaded for war, switch in mid-air and produce for peace? Not unless they have CASH — accumulated to carry over the transition and pay wages. American war industry must be allowed to *Hold Some Profits in Reserve* — in Trust for those 11,000,000 Jobs.

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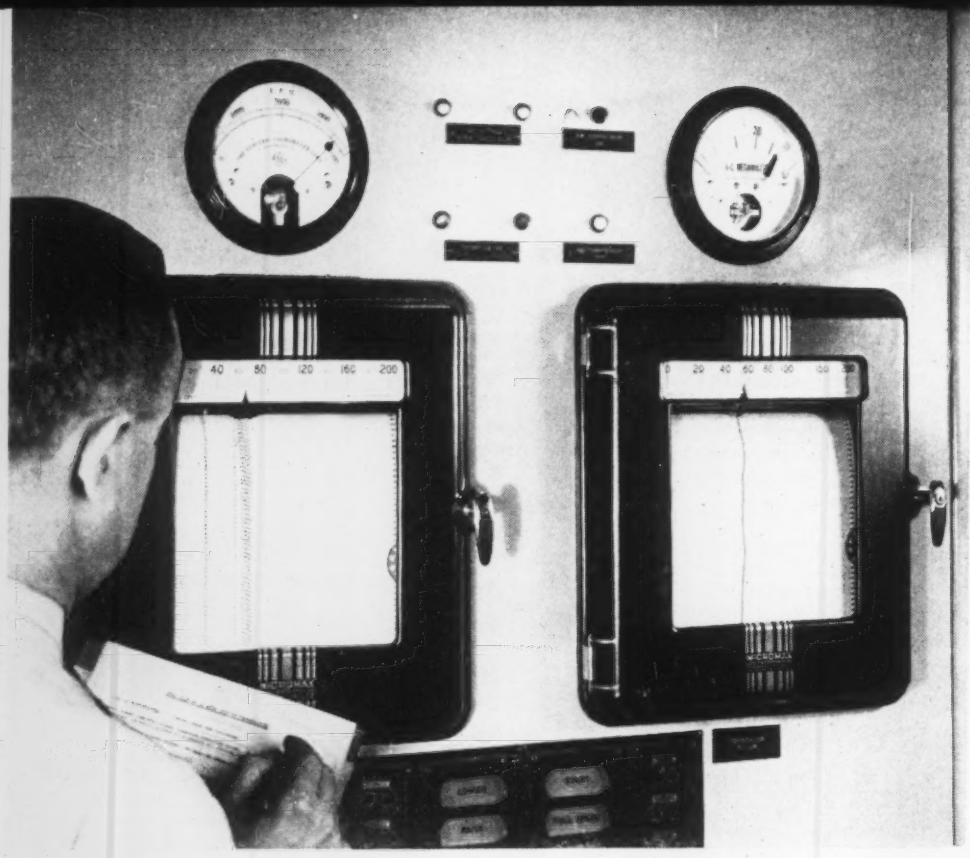


Micromax Recorder at left shows temperature of 6 points in stator, and also of exciter air and outlet water of the hydrogen cooler of a generator in Ohio. Recorder at right shows temperature of the field. Watching these 9 temperatures is essential when carrying heavy load, though Recorders will also sound alarms if any one temperature exceeds a predetermined point.

OVERLOAD PILING UP?

Fields and Stators are Safer When A Micromax Recorder Watches Each

Loading of electrical generators on the basis of the temperatures of their stators and rotors is a practice which is now gaining ground, especially where load is so heavy that individual machines must carry even more than their usual percentage of nameplate-rated loads. Many power companies are now running special tests to determine the amounts of load which may be added, under specific conditions, to that given as maximum on the nameplate. Here are some of the factors to be considered:*

1. Each generator is a separate problem.
2. Nameplate data may provide unnecessarily large safety factor for load swings, unbalanced phases, etc.
3. Ambient temperature may be less than nameplate specifies.
4. Power factor may be higher than specified.
5. Change in terminal voltage may permit greater output.
6. When starting from low temperature, a generator can carry short-time excess load because of its own temperature lag.
7. In emergencies and for short peaks it may be more economical to operate at extraordinary temperature and thus age the insulation at an abnormal rate, rather than to provide the additional rated capacity for short-time loads.

When a generator is loaded on the basis of temperature, we can supply its operator with complete temperature readings by means of two instruments—a Micromax Stator Temperature Recorder and its companion, a Rotor Recorder.

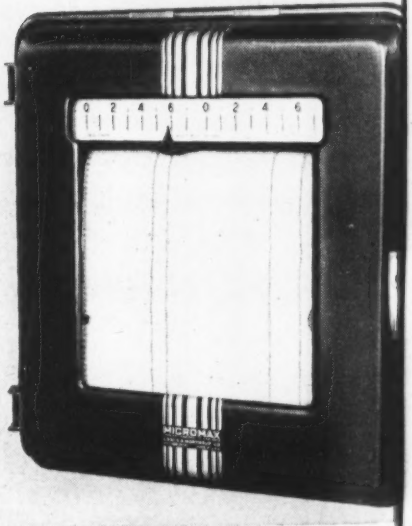
The Stator Recorder shows the temperature of 6 points, and of incoming and outgoing cooling medium. It sounds an alarm if a peak temperature is reached.

The Rotor-Temperature Recorder measures the resistance of the entire field and records it as temperature. Devised about 15 years ago, it has been less used than the Stator Recorder, for the reason that not every generator normally needs both instruments. As load becomes abnormal, or unfavorable power factor conditions occur, however, it is often wise to measure the field temperature directly.

Further information in Catalog N-33-161.

*Abstracted from a small portion of AIEE Miscellaneous Paper 43-93, "Interim Report on Emergency Measures to Increase Output of Generating Equipment and Systems", June 1943, available at 65c from AIEE, 33 W. 39th St., New York City.

V depends on me!
A Slogan For All Americans



NEW! SPLIT-CHART MICROMAX FOR STEAM TEMPERATURES

When you want clearly to separate two temperatures recorded by one instrument, and they are almost identical, you can keep them from recording on top of each other by using a Split-Chart Micromax Recorder, shown above. All temperatures of one boiler go on left-hand; all of other boiler go on right-hand; thus there's no confusion. Designed especially for power-plants, with daily tear-off and multicolor record if desired. Further facts either from an L&N Engineer or from Folder N-163(2), as you prefer.

Ad N 33-161(4)

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Instruments THE MAGAZINE OF Measurement and Control

M. F. BEHAR, Editor

SPECIAL ISSUE—GOV'T ORDERS affecting INSTRUMENTS

"Not Only Justified, But Necessary"

THESE are the closing words of the article by Ernest A. Capelle on WPB industrial instrument regulations which "introduces" this Special Issue of *Instruments*. Inasmuch as Mr. Capelle and several other officials were instrument men themselves (in manufacturing plants and in instrument companies), our readers can rest assured that they have nothing to fear from "Washington bureaucrats" when it comes to ordering instruments.

Delays? Of course—but only as absolutely necessary. Denials of applications? Well, we can't say "never" but we never heard of any instance where Uncle Sam was unreasonable.

What applicants (or "claimants") should do is to familiarize themselves as much as possible with regulations affecting them—and then, if they are not certain that they understand the legalistic language, consult the nearest LOCAL office of WPB (or of whatever other agency is concerned).

The best way to consult your local representative is by SEEING him; the next best way is to 'phone. Letters are promptly answered, of course, but this applies to letters requesting specific information—not letters asking to be "educated" into the "mysteries" of regulations. Local offices are not mail colleges!

Please do not write to *Instruments* for any legalistic explanations or elucidations. There is no lawyer and (to the best of the writer's knowledge) there is not even a former law student in the main office or in the five branch offices of this company. However, if you think the Instruments Publishing Company can be of any help in some other way, do not hesitate to write. Mr. Rimbach, our company president, goes to Washington about twice a month, and he has already straightened out several matters by simply bringing pending cases to the attention of various "bureaus," "divisions," "branches," "sections," "units" or individual government employees. As he modestly explains: "It's nothing but leg work and you can tell the readers I'll do it as long as my shoes hold out."

Collateral reading will be helpful in connection with the study of government orders. We can't recommend any particular text by name—whether it be a book, pamphlet or magazine article—but we feel safe in recommending, first of all, the various government booklets and mimeographed releases; next, the current articles in business and industrial journals, written by experienced industrial executives who have grasped the fundamental fact that, as Mr. Capelle puts it, "the manufacturing sources of the country are considered as one national concern." We've *got* to win this war!

The statements on the following pages by Messrs. Capelle, Worden and Watts, which are written for "us guys," deserve careful reading. In previous issues, too, there have appeared general and specific articles of interest:

H. P. Rockwell, "Substitutes for Strategic and Critical Materials." Nov. 1942, page 447.

M. F. Behar, "First Comprehensive Standard on Electrical Instruments is Promulgated." April 1943, pages 190, 216-222, 246.

(WPB release) "Precision Measuring Instruments for Individuals." April 1943, page 226.

H. P. Rockwell, "Instrument Men Represented in WPB." (includes organization chart, names, telephone extension numbers, etc.) May 1943, page 268.

A list of the orders reproduced in facsimile in this issue appears below. Not included are L-203 (electrical indicating instruments) which was published in our July issue; and the six-page M-293 ("critical components") which covers so many kinds of items that "everybody" in industry has it.

—MFB

WPB ORDERS IN THIS ISSUE

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WPB Regulations Pertaining to Industrial Instruments

By ERNEST A. CAPELLE

Chief, Industrial Instrument Branch, Radio and Radar Division, War Production Board

THAT this country is engaged in a total war with all its implications has been repeatedly stressed. Equipment is playing an important part in the trend of this war, and the industrial resources of this country are doing a splendid production job. To supply the required volume and type of equipment, at the right time, it has been necessary to make some sweeping changes in the industrial economy. We are to consider the regulations which have shaped industrial instrument and control-valve production to meet the exigences of war.

In a recent memorandum of all employees of the War Production Board, Mr. Nelson stated in part: "It is our duty to give our fighting men equipment so powerful that it will protect them on the battlefield, break the spirit of the enemy, and shorten the war. No matter what your job, if you contribute directly or indirectly to the production of more and better weapons, you hasten the hour of victory, and literally save American lives."

In speaking of industrial instruments, reference is made to items such as pyrometers, flow and liquid level instruments, tube-system temperature instruments, industrial thermometers, pressure gages, diaphragm-motor control valves and regulators.

To meet the wartime requirements for these products, the manufacturing sources of the country are considered as one national concern producing to fulfill all domestic requirements and those of foreign origin to which this country's production is committed. Based on this fundamental consideration, combined production must be made available to meet domestic and foreign needs. Omitting consideration of other factors, increased war production may be obtained in one or more of the following methods:

1. Eliminate non-essential production
2. Increase facilities
3. Operate "round the clock"
4. Streamline production

Other factors, however, must be considered when production is increased, especially on a national scale. Material shortage may obviate the advisability of increasing facilities, at least until other methods have been tried and proved insufficient. Owing to the needs of the services and other new and expanding facilities, manpower probably will not be available to operate round the clock. Therefore, the streamlining of production and the elimination of non-essential production are the remaining means to increase output.

The aforementioned analysis has been made without consideration for policies which must be established to deal with the material and manpower shortages. Obviously, construction of new facilities cannot be authorized if some other methods can be employed to secure the desired result without the use of additional material and labor.

If output is to be increased it therefore is clear that production of non-essentials must be curtailed or eliminated, production streamlined through standardization and simplification, and the use of critical materials conserved. It may be necessary also to restrict the end use of the products to the most essential applications or uses. If any or all of these steps are to be accomplished, they must apply to all concerned. A competitive advantage cannot be permitted as a result of governmental action. Regulations, with suitable authority and penalty to assure their compliance, must be prepared and published. These regulations, when considered with respect to an industry as a whole, are analagous to the policies and procedures established by individual concerns for the organized and proper conduct of their business.

There is also the matter of delivery scheduling. In pre-war days a producer's deliveries were determined by the circumstances surrounding his sales. If productively possible, a good customer could write his own delivery ticket. Less favored customers were sometimes forced to wait as a result. The producer's Sales Department determined deliveries—considering, of course, the sales factors involved.

In wartime the government is responsible for the successful conduct of the fight against the enemy. It is the government who must obtain the equipment and personnel, and obtain them on time! The government is, therefore, the purchaser, either directly or indirectly, for practically all essential items.

Where the supply is considerably in excess of essential requirements, the priority system is a satisfactory mechanism to assure delivery to meet these essential requirements. Where, however, the essential demand approaches or exceeds the available supply in any given period, experience has proved that the priority system is not adequate. This is especially true where a so-called "horizontal product" is involved.

The War Production Board has, therefore, found it necessary to resort to the scheduling of deliveries of certain critical products or components to assure arrival on time! This is not production scheduling. It is delivery scheduling. It replaces the pre-war activities of the Sales Department and it replaces the delivery established by the producer according to the priorities received on his orders. Production scheduling, as it was performed by the producer in pre-war times, and also under the priority system, is also performed under the system of delivery scheduling and may be done in the same manner. Furthermore, a producer's schedule is not "frozen" when his deliveries are scheduled, and production is not limited to the amount scheduled.

Delivery scheduling can only operate with the close coöperation of the producer, the various claimants, and the War Production Board. Usually, where more than two agencies are claimants for the product concerned, a list of the unfilled orders on hand is prepared by the producer and submitted to the appropriate Industry Division of War Production Board. The claimants then specify the "on time" delivery required on each order REGARDLESS OF PRIORITY RATING. The dates so established are not limited to the next succeeding month or months. The schedule as prepared fixes the actually-required delivery date for each order, even though this may be many months later. Orders for quantities are spread out as required.

If the amount scheduled for delivery exceeds the manufacturer's stated capacity for a given period, the claimants are asked to reconsider their stated delivery dates and the producer his stated capacity, in consideration of this situation. If this procedure does not provide the solution, and if no other exists, then another producer, if available, will be brought in to produce the excess required.

The government is assured "on time" delivery of its requirements, and the producer does not deliver any portion of his production ahead of the time needed. Disappointments and consequent delays are avoided, and ambitious but unwarranted expediting is eliminated. The amount of work involved in preparing an "order board" is more than offset by reduction in the time spent dealing with expeditors, by a more stabilized production, and by the use of any open capacity scheduling provides the producer.

Broadly speaking, War Production Board regulations applying to industrial instruments, control valves, and regulators fall into two categories: general and specific.

Under the heading of "general regulations" may be classified the broad limitations affecting the use of:

1. Materials, such as Copper Conservation Order M-9-e. Tin Conservation Order M-43, Aluminum Order M-1-i, Cadmium Conservation Order M-65-a, etc.
2. Components, such as Electronic Equipment Order L-265, Steel Pipe Fittings Order L-278, etc.

In general, these orders limit the use of material and components to essential uses or specified types.

Under the heading of "specific regulations" may be classified those limitations which apply specifically to the products with which we are dealing. Limitation Order L-134 restricts the use of chromium and nickel in the manufacture of instruments, control valves, and regulators, Limitation Order L-272 provides for the standardization and simplification of selected items in order to streamline and thereby increase production. General Limitation Order L-234 provides for the scheduling of deliveries of specified types of equipment. Under General Scheduling Order M-293, control valves and liquid level controllers are designed as a Y item and authorization to purchase is required on purchases over $5000. In addition to these general orders, the War Production Board may issue specific directions to a producer to discontinue the production of items which can be obtained from other sources, and to concentrate on others vitally needed which cannot be secured elsewhere.

It is not always apparent in individual instances whether some of these regulations are justified. The same question often arises when any policy is established, whether by the government, by a company, by a social organization, or by a community. It can only be stated here that it is the sincere opinion of those responsible for helping to get the job done, that the regulations that have been or will be issued are not only justified but are necessary.

Petroleum Industry Priority Regulations

By F. A. WATTS

Director of Materials, Petroleum Administration for War

Your letter of July 26 requests that we advise you of any orders issued by the Petroleum Administration for War in relation to "instruments and devices for measurement, inspection, testing and control which are still in force." In line with this request, we are attaching copies of the current Preference Rating Orders—P-98b, P-98c and the PAW Redistribution Program No. 2.

P-98b is the Preference Rating Order under which the Petroleum Industry acquires material for production and construction operations, as well as for maintenance, repairs, or operating supplies.

Under P-98b, please refer to Schedule D, Part II, Page 6. You will note that under Paragraph B (ii), we require the pre-submission of purchase orders covering industrial control instruments, including relief and control valves and regulators. The purpose of requiring prior submission of purchase orders and countersignature of same for this class of material is to assure our High Octane Aviation Gasoline Program preference in obtaining this class of equipment. Also, certain process use of instruments, while necessary, can be deferred pending the completion of our Wartime Construction Program. Further, unessential use of this most critical and important equipment can be prevented.

Preference Rating Order P-98c is the order under which sales of idle or excess material may be made by persons engaged in petroleum industry operations to other persons in the same industry. Please refer to Schedule C. You will note that control instruments of the industrial type, including regulators and control valves, are mentioned under this schedule. Preference Rating Order P-98c was written to implement PAW Redistribution Program No. 2, whose prime purpose is to utilize existing surplus critical material within the petroleum industry. If you will refer to Schedule C, on Page 6 of PAW Redistribution Program No. 2, you will note that control instruments are mentioned as being items of critical interest to both the Natural Gasoline and Refining Divisions of our Industry.

The principal interest of the Petroleum Administration for War in regard to instruments and control equipment is to assure an adequate supply of same in relation to our most important programs, denying unessential use completely. It is further our policy to insist on prior use of existing suitable surplus equipment before permitting the purchase of new equipment. We believe that this policy is in the best interests of the Petroleum Industry as a whole, as well as all other War Programs urgently needing control equipment as component and vital parts of such programs.

Very truly yours,

July 31, 1943. F. A. WATTS,
Attachments. *Director of Materials.*

[EDITOR'S NOTE—The enclosures total nineteen pages of small type, plus a map and a full-page chart. Since these interest only our readers in the petroleum industry or otherwise under the Petroleum Administration for War, we believe that it is not necessary for these enclosures to be reproduced in facsimile—especially in view of the fact that Mr. Watts has so ably described them.—MFB]

APB Standardization of Instrument Production

By LLOYD A. WORDEN

Conservation and Standards Division, Resources Control Office, Aircraft Production Board

One of the problems of manufacturing and maintaining aircraft instruments has been the lack of standardization with an insufficient supply of instruments because of the tremendously increased needs, far exceeding prewar capacity. The Armed Forces and the Aircraft manufacturers were having increasing difficulty in maintaining an alternate source of supply because of the lack of instrument interchangeability. The instrument manufacturers were being handicapped by the multiplicity of orders for instruments, basically the same, but varying in the superficial details of external design. Priority Regulation No. 1 forced the instrument manufacturer to accept orders for instruments of all designs when ordered for aircraft use.

A committee composed of the Army Air Force, Bureau of Aeronautics, and the War Production Board undertook to solve this problem. It could be solved by one or two methods: (a) placing a blanket limitation order on the Aircraft instrument industry, or (b) analyzing the production facilities of each company and placing a separate limitation order on each company according to their ability to produce specific instruments. The latter method (b) was chosen by this committee as the one most desirable to be used on Aircraft instruments. The Aircraft instrument manufacturers were visited by the Committee and with the company's representatives reviewed their production facilities and agreed on a single design of each type of instrument manufactured.

The instruments selected were placed on an approved List A. The attached letter together with the approved List A chosen by the Committee, was issued by the Office of the

Director of Operations, War Production Board to the following companies:

Aero Instrument Co.	Maxwell, Manning & Moore
Cruver Mfg. Co.	Moto Meter Co.
Bulova Watch Co.	Northern Engraving & Mfg. Co.
Edison-Splitdorf Co.	Pioneer Instrument Co.
Elgin Watch Co.	Ranco Inc.
G. Felsenthal & Sons	Thomas A. Edison
General Electric	U. S. Gauge
Hickok Electrical Instrument	Waltham Watch Co.
Kollsman Instrument Division	Westinghouse
Lewis Engineering Co.	Weston
Liquidometer Corp.	Wheelco

This was the legal way to establish the approved list and protect the manufacturer from Priority No. 1. A list of the instruments chosen is as follows:

Accelerometers	Dial Change Indicators
Aircraft Nav. Plotting Board	Drag Cup
Aircraft Clocks	Driftmeters
Air Position Indicator	Drift Sight
Airspeed Indicator	Dual Oil Pressure Gauge
Airspeed Warning Switch	Electric Tach. Generator
Air Pressure Gauge	Engine Gauge Unit
Altimeters	6' Engine Lead, 12', 9'
Altitude Warning Switch	B9 Extension Lead, B-11
Automatic Pilot	Firewall Block
Autosyn Type Indicators	Free Air Thermometer
Base Mark 2B Driftsight	Fuel Flow Transmitter
Base Thermocouple—Mark II	Fuel Pressure Gauge, (single, dual)
Binocular	Fuel Pressure Signal
Capillary Thermometer (Oil)	Fuel Pressure Trans.
Chart Plotting Board	Fuel Pressure—Warning Unit
Chronograph Watch	Gas Gauge Indicators
Cabin Pressure Switch	18 MM Gasket Couple, 14 MM, etc.
Check Valves	Gyro Fluxgate Compass—Indicator
Clock	Gyro Indicator—Flight
Compasses (direct) (remote)	Gyro Indicator—Turn
Climb Indicator	Hack Wrist Watch
Computer—True Air Speed Dead Reckoning	Hydraulic Pressure Gauge
Cruising Calculator Mark 1, 1A	Head Mark 2B Driftsight
60 Cycle Autosyn Trans.	Horsepower Meter Indicator, Trans.
60 Cycle Autosyn Ind.	Hydrostatic Fuel Level
Civil Aeronautic Clock	Inclinometer
De Icer Gauge	Indicators
	Indicator Lead
	Indicator—Thermocouple (single, dual)
	Inverter
	Lapse Time Clock
	Liquid Level Gauge Trans.
	Liquid Level Trans.
	Magnesyn Compass
	Manifold Pressure Gauge (single, dual)
	Manifold Press. Trans.
	Mark VIII Computer
	Master Navigation Watch
	Movement Mechanisms
	Oil Pressure Gauge (single, dual)
	Oil Pressure Transmitter
	Oil Pressure—Warning Unit
	Oxygen Pressure Gage
	Oxygen Regulators
	Pitot-Static Tube
	Pitot Tube
	Pocket Compass
	Position Indicators
	Position Transmitters
	Pressure Limiting Valve
	Pressure & Temperature Indicators
	Pressure Transmitters
	Rate of Climb Indicator
	Ruler—Aircraft Nav. Mark III-IV
	Selector Switch
	Sensitive Altimeters
	Sextant—Bubble type
	Square Search Computer
	Suction Gauge
	Suction Regulating Valves
	Sumps
	Switch Load
	Synchroscope
	Stop Watch
	Tachometer (special)
	Tachometer Indicator—Single, dual, etc.
	Tank Units
	Telegon
	Teletorque
	Temperature Bulbs
	Temperature Indicator
	Temperature Transmitters
	Template—Aircraft Plotting Board
	14 MM Thermocouple—Gasket type
	18 MM Thermocouple—Gasket type
	Thermometer—Free Air Strut
	Thermometer Bulbs (long) (short)
	Time Distance Computer
	Trailing Bomb—Indicator
	Torque Meter Gauges
	True Airspeed Computer
	True Altitude Computer
	Turn & Bank Indicator
	Universal Thermometer (single, dual)
	Vacuum Gauges
	Vacuum Warning Unit
	Venturi Tube
	Warning Signal—Unit Panels
	Watch, Navigation Stop
	Weems Aircraft Plotter

This method of standardizing has met with the approval of industry and has reduced the number of kinds of instruments manufactured in most plants about 75%, and in specific cases, the same instrument from 53 models to one model.

Yours truly,
LLOYD R. WORDEN
Conservation & Standards Division

WPB ORDERS

The following are fac-simile reproductions of all WPB orders now in force affecting instruments and instrumentation accessories. The selection was made by Richard Rimbach, President of The Instruments Publishing Company.

E-5-a

PART 3274—MACHINE TOOLS AND INDUSTRIAL SPECIALTIES [1]

GAGES AND PRECISION MEASURING HAND TOOLS

[General Preference Order E–5–a as Amended July 26, 1943]

The fulfillment of requirements for the defense of the United States has created a shortage in the supply of gages and precision measuring hand tools, for defense, for private account, and for export; and the following order is deemed necessary and appropriate in the public interest and to promote the national defense:

§ 3274.41 [1] *General Preference Order E–5–a*—(a) *Definitions.* For the purpose of this order:

(1) "Person" means any individual, partnership, association, business trust, corporation, governmental corporation or agency, or any organized group of persons, whether incorporated or not.

(2) "Producer" means any person who is engaged in the manufacture of gages or precision measuring hand tools.

(3) "Approved user" means any of the following:

(i) The Army or Navy of the United States, the United States Maritime Commission, the War Shipping Administration, the Panama Canal, the Coast and Geodetic Survey, the Coast Guard, the Selective Service System, the Civil Aeronautics Administration, the National Advisory Committee for Aeronautics, the Office of Scientific Research and Development, Defense Supplies Corporation, Metals Reserve Company.

(ii) Any person producing any product or conducting any business listed on Schedule I or II of CMP Regulation No. 5, as amended from time to time.

(iii) Any person conducting any activity or rendering any service listed on Schedule I or II of CMP Regulation No. 5A, as amended from time to time.

(iv) The government of any country designated, under the Act of March 11, 1941, entitled "An Act to Promote the Defense of the United States" (Lend-Lease Act), as eligible to receive lend-lease aid.

(v) Any person to whom the Board of Economic Warfare has approved the granting of an export license for gages or for precision measuring hand tools.

(vi) Any other persons specifically designated by the War Production Board.

(4) "Approved employee" means any person who is employed or is about to be employed by any approved user. A student of any vocational or other training school is not an approved employee as such, and sales to such students, whether by producers, distributors, or the vocational or training school itself are not permitted under the provisions of this order.

(5) "Distributor" means any person other than an approved user who purchases or accepts delivery of any gages or precision measuring hand tools exclusively for resale and not for use.

(6) "Gages and precision measuring hand tools" means those tools which are used to determine whether a product meets required dimensional specifications, excluding those gages specified on Exhibit A attached hereto and excluding devices made of wood.

(7) "Continental United States" means the territory comprising the several States and the District of Columbia.

(b) *Restrictions on sales by producers and distributors.* On and after May 1, 1943, no producer or distributor shall sell or deliver any gages or precision measuring hand tools except in fulfillment of the following purchase orders:

(1) Purchase orders placed by approved users, and by distributors, bearing a preference rating of A–9 or higher, accompanied by a statement substantially as follows which shall be in addition to any other certification required in

[1] Formerly Part 1252, § 1252.2.

applying or extending such preference rating:

Purchased pursuant to General Preference Order E-5-a. Delivery of this order will not increase the undersigned's inventory beyond a supply required by the undersigned's current practices for use or for resale during a thirty-day period, except as permitted by paragraph (e) of General Preference Order E-5-a.

Provided, however, No such statement is required to accompany purchase orders for those production type gages listed on Exhibit B attached hereto.

(2) (i) Purchases made by approved employees prior to August 15, 1943 bearing a preference rating of AA-2X or higher, accompanied by a certification by the approved employee and an authorized official of his employer (which employer must be an approved user) signed either manually or as provided in Priorities Regulation 7, substantially as follows:

Preference Rating ------ (specify rating) EHT. The following gage or precision measuring hand tool.----------

---

(only one tool may be placed on each certification; specify type and size of tool)

is required by the undersigned approved employee as a condition to retaining or obtaining employment with the undersigned approved user as defined in General Preference Order E-5-a. The undersigned approved employee further certifies that he does not own or possess any similar gage or tool capable of use in his employment.

Name of Approved Employee

Position: ----------

Name and Address of Approved User

Authorized Signature

(ii) Deliveries to an approved employee prior to August 15, 1943, of gages and precision measuring hand tools which are required by him as a condition to retaining or obtaining employment with an approved user are hereby assigned the same preference rating as is assigned to such approved user's purchase of maintenance, repair and operating supplies by CMP Regulation 5 or CMP Regulation 5A. (For example: Deliveries to an approved employee of gages and precision measuring hand tools required in his employment in a plant manufacturing ammunition are assigned a preference rating of AA-1, this being the same rating assigned to his employer (an approved user) by Schedule I of CMP Regulation 5.) After August 15, 1943, employees requiring gages and precision measuring hand tools will be expected to obtain them in accordance with the procedure contained in Direction 9 to CMP Regulation 5.

(iii) A preference rating assigned under paragraph (b) (2) (ii) of this order shall be applied by placing the rating at the commencement of the joint certification required from the approved employee and his employer by paragraph (b) (2) (i) of this order.

(iv) A person who receives a purchase order rated and endorsed in accordance with paragraph (b) (2) of this order may extend the rating to the extent permitted by Priorities Regulation No. 3 (using the endorsement therein specified) and accompanying such endorsement with the symbol EHT and a statement substantially in the same form as set forth in paragraph (b) (1) of this order.

(v) The symbol EHT shall constitute an "allotment symbol" for the purposes of CMP Regulation No. 3, and a purchase order bearing the symbol EHT shall have the status of a delivery order bearing a preference rating with an allotment symbol as provided in CMP Regulation No. 3.

(3) Purchases by any employee of gages or precision measuring hand tools rated pursuant to Direction 9 to CMP Regulation 5 and accompanied by the joint employer-employee certification therein provided for.

(c) *Restrictions on sales by approved users.* On and after May 1, 1943, no approved user shall sell or deliver any gages or precision measuring hand tools except to persons employed or about to be employed by such approved user, or except pursuant to § 944.11 of Priorities Regulation No. 1.

(d) *Effect of certification.* Any certification made pursuant to this order shall constitute a representation to the seller and to the War Production Board of the truth of the facts therein set forth, upon which the seller shall be entitled to rely unless he knows or has reason to believe the same to be false.

(e) *Restrictions on inventory.* On and after May 1, 1943, no distributor or approved user shall buy or accept delivery of any gage or precision measuring hand tool the delivery of which will at the time effect an increase in his inventory beyond a supply required by his current practices for use or for resale during a thirty-day period: *Provided, however,* That the deliveries of gages or precision measuring hand tools pursuant to the following designated types of purchase orders shall be permitted to effect such an increase:

(1) Purchase orders placed by any procurement agency of the United States pursuant to the Act of March 11, 1941, entitled "An Act to Promote the Defense of the United States" (Lend-Lease Act).

(2) Purchase orders placed by the Army, Navy, Maritime Commission, or War Shipping Administration for gages or precision measuring hand tools required for bases or supply depots outside the continental United States, or for bases or supply depots within the continental United States which are maintained for emergency purposes or to supply such bases or supply depots outside the continental United States.

(3) Purchase orders for those production type gages listed on Exhibit B attached hereto.

(f) *Changes in schedules.* Notwithstanding any other provision of this order, the War Production Board may direct or change any schedule of production or delivery of gages or precision measuring hand tools, allocate any order for gages or precision measuring hand tools to any other producer, divert or otherwise direct the delivery of any gage or precision measuring hand tool to any other person.

(g) *Records.* Each producer and distributor shall keep and preserve for not less than two years complete records of his inventories and sales of gages and precision measuring hand tools.

(h) *Audit and inspection.* All records required to be kept by this order shall, upon request, be submitted to audit and inspection by duly authorized representatives of the War Production Board.

(i) *Violations.* Any person who wilfully violates any provision of this order, or who, in connection with this order, wilfully conceals a material fact or furnishes false information to any department or agency of the United States, is guilty of a crime, and upon conviction may be punished by fine or imprisonment. In addition, any such person may be prohibited from making or obtaining further deliveries of or from processing or using material under priority control and may be deprived of priorities assistance.

(j) *Reports.* All persons affected by this order shall execute and file with the War Production Board such reports and questionnaires as said Board shall, from time to time, request.

(k) *General Preference Order E-5 superseded.* This order supersedes as of May 1, 1943, General Preference Order E-5, issued on June 15, 1942.

(l) *Appeals.* Any appeal from the provisions of this order shall be made by filing a letter in triplicate, referring to the particular provision appealed from and stating fully the grounds of the appeal.

(m) *Communications.* All reports required to be filed hereunder and all communications concerning this order shall, unless otherwise directed, be addressed to: War Production Board, Tools Division, Washington, D. C., Ref.: E-5-a.

(n) *Applicability of regulations.* This order and all transactions affected hereby are subject to all applicable provisions of the regulations of the War Production Board, as amended from time to time.

Issued this 26th day of July 1943.

WAR PRODUCTION BOARD,
By J. JOSEPH WHELAN,
Recording Secretary.

EXHIBIT A

Spark plug gages.
Camber gages.
Caster gages.
Brake shoe gages.
Brake drum gages.
Toe-in gages.
Alignment indicators.

EXHIBIT B

Round external gages.
Round internal gages.
External thread gages.
Internal thread gages.
Snap gages.
Fixture gages.
Flat gages.

E-5a, OWI News Release, Sept. 2, 1943

Certifications bearing the symbol "EHT" (employees' hand tools) ceased to be valid after August 15 as a means of obtaining gages and precision measuring hand tools for employees, the Tools Division of the War Production Board pointed out on September 2 in clarifying the provisions of Preference Order E-5-a as amended July 26, 1943.

Paragraph (b) (2) (ii) of Order E-5-a as amended specifically states that "after August 15, 1942, employees requiring gages and precision measuring instruments will be expected to obtain them in accordance with the procedure contained in Direction 9 to CMP Regulation 5," the Tools Division said. It is important that distributors and dealers understand clearly that they should not accept EHT certifications from employees after August 15.

Where, however, the purchase has been made prior to August 15, the use of the EHT certificate is perfectly proper, and the rating may be extended by the person who received the order in the manner provided in paragraph (b) (2) (iv).

Orders placed pursuant to Direction 9 to CMP Regulation 5, however, will not contain the EHT symbol, but will be considered as MRO (maintenance, repair and operating supplies) purchases under CMP Regulation 5.

Order E-5-a as originally issued March 26 provided that employees could obtain gages and precision instruments by certification. But Direction 9 to CMP Regulation 5, issued July 9, provided that, by certification, employees could obtain *any* hand tools, including those covered by E-5-a, needed as a condition for retaining or obtaining employment. Hence Order E-5-a was amended, effective August 15, to conform.

E-9

Part 3170—Precision Measuring Instruments and Testing Machines

[General Preference Order E-9]

The fulfillment of requirements for the defense of the United States has created a shortage in the supply of precision measuring instruments and testing machines for defense, for private account, and for export; and the following order is deemed necessary and appropriate in the public interest and to promote the national defense.

§ 3170.1 *General Preference Order E-9*—(a) *Definitions.* For the purpose of this order:

(1) "Person" means any individual, partnership, association, business trust, corporation, governmental corporation or agency, or any organized group of persons, whether incorporated or not.

(2) "Producer" means any person engaged in the manufacture of precision measuring instruments and testing machines.

(3) "Precision measuring instruments and testing machines" mean any precision device, whether power driven or hand operated, of the types listed on Schedule A attached hereto having a retail sales price of $200 or more, excluding automotive maintenance equipment and precision devices designed specifically for laboratory use.

(b) *Restrictions on sales and purchases.* On and after March 10, 1943, no person shall sell, transfer, deliver or accept delivery of any precision measuring instrument or testing machine unless there has been assigned to the purchase thereof a preference rating of A-1-a or higher by a preference rating certificate PD-1A, PD-3, PD-3A, a preference rating certificate in the PD-408 series, a preference rating order No. P-19-h, or by a rerating direction or certificate PD-4X or PD-4Y. From and after March 10, 1943 every producer shall require any person placing a purchase order for a precision measuring instrument or testing machine to furnish to the producer a copy, reproduced in accordance with Priorities Regulation No. 5, of the preference rating certificate PD-1A, PD-3, PD-3A, PD-408, the preference rating order P-19-h or the rerating direction or certificate PD-4X or PD-4Y.

(c) *Repair parts.* Nothing in this order shall be deemed to prevent the sale and delivery of any part manufactured for use in the repair or maintenance of precision measuring instruments or testing machines. Purchase and delivery of such repair parts shall be in accordance with current regulations and orders of the War Production Board.

(d) *Schedules to be filed.* (1) The Director General for Operations may from time to time require any producer to notify the War Production Board of all unfilled orders for any type of precision measuring instrument or testing machine, together with such producer's proposed schedule for delivery thereof. Thereafter, until otherwise directed by the Director General for Operations, such producer shall immediately notify the War Production Board of each new order, together with his proposed schedule for delivery thereof, for any precision measuring instrument or testing machine of the same type as any concerning which notification has been previously required. Any notification required by this paragraph shall be filed on Form PD-669 in accordance with the instructions attached thereto.

(2) Until otherwise directed by the Director General for Operations, every producer who shall have been required to file any notification of unfilled orders and proposed schedule of delivery of precision measuring instruments or testing machines pursuant to paragraph (d) (1) hereof shall also file on Form PD-670 notification of shipment of any such precision measuring instruments or testing machine by such producer and notification of any change in any order previously reported immediately following such shipment or immediately following change in any such order by such producer as the case may be.

(e) *Postponement of purchase orders.* Unless the Director General for Operations specifically orders otherwise, no higher preference rating shall operate to postpone or in any way affect any delivery of any precision measuring instrument or testing machine under a purchase order already scheduled for delivery where such delivery is to be made within 60 days of receipt of such higher preference rating.

(f) *Specific modifications of schedules.* Notwithstanding any other provisions of this order, the Director General for Operations at any time may direct or change the schedule for deliveries, allocate any order to any other producer, or direct the delivery of any precision measuring instruments or testing machine to any other person in accordance with prices and terms regularly established for sales by the supplying manufacturer to such a purchaser.

(g) *Applicability of regulations.* All transactions affected by this order are subject to applicable provisions of the regulations of the War Production Board, as amended from time to time except to the extent that any provisions hereof may be inconsistent therewith, in which case the provisions of this order shall govern.

(h) *General Preference Orders E-1-b and E-5 superseded.* This order supersedes General Preference Orders E-1-b and E-5, as to precision measuring instruments and testing machines.

(i) *Records.* All persons affected by this order shall keep and preserve for not less than two (2) years accurate and complete records concerning inventories, purchases, production and sale.

(j) *Audit and inspection.* All records required to be kept by this order shall, upon request, be submitted to audit and inspection by duly authorized representatives of the War Production Board.

(k) *Violations.* Any person who wilfully violates any provision of this order or who, in connection with this order, wilfully conceals a material fact or furnishes false information to any department or agency of the United States is guilty of a crime, and upon conviction may be punished by fine or imprisonment. In addition, any such person may be prohibited from making or obtaining further deliveries of, or from processing or using material under priority control and may be deprived of priorities assistance.

(l) *Appeal.* Any appeal from the provisions of this order shall be made by filing a letter in triplicate referring to the particular provisions appealed from and stating fully the grounds of the appeal.

(m) *Communications.* All communications concerning this order, except where specific reference is made hereto to the contrary, shall be addressed to Industrial Specialties Division, War Production Board, Washington, D. C., Ref. E-9.

Issued this 10th day of March 1943.

Curtis E. Calder,
Director General for Operations.

Schedule A to General Preference Order E-9

1. Balancing Machines
2. Bench Centers
3. Comparators
4. Dividing Machines
5. Gaging Machines
6. Hardness Testers
7. Light Wave Measuring Instruments and Devices
8. Measuring Machines
9. Physical Testing Machines
10. Super Micrometers
11. Surface Measuring Instruments
12. Toolmakers Microscopes

L-58

TITLE 32—NATIONAL DEFENSE
CHAPTER IX—WAR PRODUCTION BOARD
SUBCHAPTER B—DIVISION OF INDUSTRY OPERATIONS
PART 1118—SEXTANTS
Limitation Order No. L-58

The fulfillment of requirements for the defense of the United States has created a shortage in the supply of Sextants for defense, for private account and for export; and the following Order is deemed necessary and appropriate in the public interest and to promote the national defense:

§ 1118.1 *Limitation Order No. L-58.*

(a) *Definitions.* For the purpose of this Order:

(1) "Dealer" means any person who, prior to the effective date of this Order, was engaged as a part of a regular business in the selling of new or used Sextants.

(b) *Control of Imports.* From and after the effective date of this Order no person shall import any Sextant into the United States from Great Britain unless the importation thereof has been approved by the Lend-Lease Administration under the terms of the Eden White Paper.

(c) *Prohibition of Sales.* From and after the effective date of this Order no person shall sell, deliver, transfer or otherwise dispose of any Sextant except:

(1) to the Army or Navy of the United States Maritime Commission, the Panama Canal, the Coast and Geodetic Survey, the Coast Guard; or to any other department or agency of the United States.

(2) to a purchaser who files with the transferor of such Sextant, a certificate from the United States Coast Guard stating that such purchaser is in immediate and legitimate need of and is entitled to obtain, a Sextant;

(3) to a Dealer;

(4) to any person pursuant to a specific order of the Director of Industry Operations.

No person other than those specified above shall buy, or accept delivery or transfer of any Sextant.

(d) *Applicability of Priorities Regulation No. 1.* This Order and all transactions affected thereby are subject to the provisions of Priorities Regulation No. 1, as amended from time to time, except to the extent that any provision hereof may be inconsistent therewith, in which case the provisions of this Order shall govern.

(e) *Records.* All persons affected by this Order shall keep and preserve for not less than 2 years accurate and complete records concerning inventories, purchases, production and sales.

(f) *Reports.* All persons affected by this Order shall execute and file with the War Production Board such reports and questionnaires as said Board shall from time to time require.

(g) *Audit and Inspection.* All records required to be kept by this Order shall, upon request, be submitted to audit and inspection by duly authorized representative of the War Production Board.

(h) *Violations.* Any person who willfully violates any provision of this Order, or who by any act or omission falsifies records to be kept or information to be furnished pursuant to this Order, may be prohibited from receiving further deliveries of any Material subject to allocation, and such further action may be taken as is deemed appropriate, including a recommendation for prosecution under Section 35 (A) of the Criminal Code (18 U.S.C. 80).

(i) *Appeal.* Any person affected by this Order who considers that compliance therewith would work an exceptional and unreasonable hardship upon him, or that it would result in a serious problem of unemployment in the community, or that compliance with this Order would disrupt or impair a program of conversion from nondefense work, may apply for relief by addressing a letter to the War Production Board setting forth the pertinent facts and the reasons such person considers that he is entitled to relief. The Director of Industry Operations may thereupon take such action, if any, as it deems appropriate by the amendment of this Order or otherwise.

(j) *Communications.* All communications concerning this Order shall be addressed to War Production Board, Washington, D. C., Ref: L-58.

(k) *Effective Date.* This Order shall take effect immediately.

Issued this 11th day of March, 1942.

J. S. KNOWLSON
Director of Industry Operations

L-58 Interpretation

TITLE 32—NATIONAL DEFENSE
CHAPTER IX—WAR PRODUCTION BOARD
SUBCHAPTER B—DIVISION OF INDUSTRY OPERATIONS
PART 1118—SEXTANTS
Interpretation No. 1 of Limitation Order No. L-58

The following official interpretation is hereby issued by the Director of Industry Operations, with respect to Section 1118.1 (Limitation Order No. L-58):

The word "Sextant" as used in this Order means only a mariner's sextant, to the exclusion of such other sextants as are not usually used at sea. If, however, a sextant other than a mariner's sextant is converted so as to enable its use as a mariner's sextant, it becomes subject to the terms of Limitation Order No. L-58.

Issued this 22nd day of May, 1942.

J. S. KNOWLSON
Director of Industry Operations

L-134

PART 1244—INSTRUMENTS, VALVES, AND REGULATORS USED IN INDUSTRIAL PROCESSES

[Conservation Order L-134, as Amended Jan. 30, 1943]

The fulfillment of requirements for the defense of the United States has created a shortage in the supply of chromium and nickel for defense, for private account and for export; and the following order is deemed necessary and appropriate in the public interest and to promote the national defense.

§ 1244.1 *Conservation Order L-134—*

(a) *Definitions.* For the purposes of this order:

(1) "Person" means any individual, partnership, association, business trust, corporation, governmental corporation or agency, or any organized group of persons whether incorporated or not.

(2) "Manufacturer" means any person manufacturing any industrial instrument, instrument end, instrument connection, control valve, or regulator as defined below, to the extent he is engaged in such manufacture; and includes sales and distribution outlets controlled by such manufacturer.

(3) "Dealer" means any person primarily engaged in the business of selling or distributing industrial instruments, control valves, or regulators, whether at wholesale, retail, or otherwise, but does not include sales and distribution outlets controlled by a manufacturer.

(4) "Industrial instrument" means any type of indicating, recording or measuring, or controlling instrument ordinarily used in industrial processes and containing an instrument connection listed in paragraph (5) below, or an instrument end listed in paragraph (6) below; except "laboratory equipment" as defined in Order L-144.

(5) "Instrument connection" means any of the following, to the extent used with or in an industrial instrument, if fabricated in whole or in part from nickel, chromium, or any alloy thereof: capillary tubing having an internal diameter of .025" or less; protective armor tubing; tubes or springs (pressure measuring systems); diaphragms or bellows (pressure measuring systems except differential measuring systems) and extension lead wire.

(6) "Instrument end" means any of the following to the extent used with or in an industrial instrument, if fabricated in whole or in part from nickel, chromium, or any alloy thereof; sockets, wells, protecting tubes, sheaths and target tubes; liquid level floats, float rods, float cages and flanges, expansion and immersion tubes; venturi tubes; cleanout valve trim and liner for use with venturi tubes; flow nozzles; orifice plates; orifice meter accessories; thermocouples and thermocouple wire; temperature bulbs (fluid filled tube system type); bushings and revolving or coupling nuts; safety shutters and switches for radiation pyrometers; contact rods for flame control; straightening vanes; studs for differential pressure chambers; conductivity cells for measuring conductivity of fluids; pitot tubes; and flexible and rigid extension stems for temperature bulbs.

(7) "Control valve" means any glove or butterfly type valve, the inner portion of which is automatically positioned by pneumatic, hydraulic, or electric motive power, containing any of the parts listed in paragraphs (d) (1), (2), (3) and (5), provided such parts are fabricated in whole or in part from nickel or chromium, or any alloy thereof. The term shall not include any type of gate valve or slide valve.

(8) "Regulator" means any self-operated or integral pilot operated type valve used to control temperature, pressure above 25 p. s. i., pressure where inlet pressure is above 25 p. s. i. flow or liquid

level, and containing any of the parts listed in paragraphs (d) (1), (2), (3), and (5), provided such parts are fabricated in whole or in part from nickel or chromium, or any alloy thereof.

[Subparagraph (9) revoked January 30, 1943.]

(b) *General restrictions.* (1) On and after September 9, 1942, no manufacturer shall knowingly put in process any chromium, nickel, or alloy thereof, in the production of any instrument end, instrument connection, industrial instrument containing an instrument end or instrument connection, control valve, or regulator, except for use under such operating conditions, if any, as may be specified in paragraphs (c) or (d): *Provided, however,* That the provisions of this subparagraph shall not apply to such items sold to another manufacturer or dealer for resale, or to items sold for use in a foreign country (except Canada).

(2) On and after September 9, 1942, no manufacturer or dealer shall knowingly deliver, and no person shall accept delivery of, any instrument end, instrument connection, industrial instrument containing an instrument end or instrument connection, control valve, or regulator, except for use under such operating conditions, if any, as may be specified in paragraph (c) or (d): *Provided, however,* That the provisions of this subparagraph shall not apply to deliveries by a manufacturer to another manufacturer or dealer for resale, or to deliveries of any item to be used in a foreign country (except Canada).

(3) On and after September 9, 1942, no manufacturer shall put in process any chromium, nickel, or alloy thereof for the production of any instrument end, instrument connection, industrial instrument containing an instrument end or instrument connection, control valve, or regulator except in accordance with the specifications enumerated in paragraph (c) or (d).

(4) On and after September 9, 1942, no manufacturer or dealer shall accept an order for, or deliver, and no person shall accept delivery of any instrument end, instrument connection, industrial instrument containing an instrument end or instrument connection, control valve, or regulator, except pursuant to a preference rating of A–1–c or better: *Provided, however,* That the limitations and restrictions of this paragraph (b) (4) shall not apply to:

(i) Any order accepted by a manufacturer or dealer prior to September 9, 1942, and bearing a preference rating of A–10 or better, or

(ii) Any order for maintenance and repair purposes, bearing a preference rating of A–8 or better, or

(iii) Any order by and for the use of the Army, Navy, Maritime Commission, War Shipping Administration, the Panama Canal, the Coast and Geodetic Survey, the Coast Guard, the Civil Aeronautics Authority, the National Advisory Committee for Aeronautics, or the Office of Scientific Research and Development.

(5) No person shall accept delivery of any instrument end, instrument connection, industrial instrument containing an instrument end or instrument connection, control valve, or regulator for use, unless based upon experience records he expects to install the item which is being delivered, and all similar items on hand, within the next 90 days.

(6) *Certification to be furnished.* (i) Each person (other than a manufacturer or dealer acquiring the item for resale or any person purchasing the item for use in a foreign country, except Canada) receiving delivery of an instrument end, instrument connection, industrial instrument containing an instrument end or instrument connection, control valve, or regulator, shall certify to the manufacturer or dealer from whom he receives such delivery, as a condition to receiving delivery, the following on the purchase order, or in a separate letter:

The undersigned hereby certifies that

(here fill in items ordered)

will be used under the operating conditions permitted for such items under the terms of Conservation Order L–134. The operating conditions under which the items will be used are:

Here fill in operating conditions, if any (by reference to paragraph of order) for which items will be used.

---------- Company

By ----------

Provided, however, That such certification shall be required only where a limitation on the use of the item in question is prescribed in an operating condition specified in paragraph (c) or (d), except where otherwise provided in paragraph (c) or (d).

(ii) No person shall make a delivery under this paragraph (b) who has reason to believe that the person accepting delivery has furnished a false certification; and no person shall falsely furnish the certification specified above. The certification specified above shall constitute a representation to the Director General for Operations, War Production Board, of the facts certified therein.

(7) Nothing in this order shall be construed to place any restriction upon any instrument, valve or regulator, or part thereof, unless such instrument, valve, regulator or part thereof contains nickel, chromium, or any alloy thereof (not including plating); or upon any instrument, valve, regulator or part thereof which was manufactured prior to May 26, 1942.

(8) The provisions of this order shall not apply to any instrument end, instrument connection, industrial instrument containing an instrument end or instrument connection, control valve, or regulator to be incorporated in, or used exclusively on board a vessel of the Army or Navy of the United States.

(c) *Operating conditions and specifications for instrument ends, instrument connections, and industrial instruments containing instrument ends or connections.* Pursuant to the provisions of paragraph (b) hereof, the production and delivery of the following instrument ends, instrument connections, and industrial instruments containing instrument ends or instrument connections shall be governed by the following operating conditions and specifications:

(1) *Capillary tubing having an internal diameter of .025" or less*—(i) *Operating conditions.* Capillary tubing having an internal diameter of .025" or less shall be delivered for use only under the operating conditions specified in List A paragraph 1; capillary tubing for use with a mercury filled thermal system may be delivered for use under any operating condition.

(ii) *Specifications.* Capillary tubing having an internal diameter of .025" or less shall be manufactured from a metal whose nickel and chromium alloy content does not exceed that of Type 347 metal and shall be manufactured in the following four sizes only: .06" x .007", .06" x .011"; .06 x .017"; .06" x .025".

(2) *Protective armor tubing*—(i) *Operating conditions.* Protective armor tubing shall be delivered for use only under the operating conditions specified in List A, paragraph 1.

(ii) *Specifications.* Protective armor tubing shall be manufactured in lengths not in excess of 6" at either the instrument or bulb.

(3) *Tubes and springs (Pressure measuring systems)*—(i) *Operating conditions.* Tubes or springs for pressure measuring systems may be delivered for any use, but certification of operating conditions shall be required where delivery is for the use described in List A, paragraphs 1 or 2.

(ii) *Specifications.* The total nickel and chromium alloy content of such tubes or springs shall not exceed 6% chromium (with no nickel): *Provided, however,* That for use under the operating conditions described in List A, paragraphs 1 or 2, the total nickel and chromium alloy content shall not exceed 32%.

(4) *Diaphragms or bellows. (Pressure measuring systems except differential measuring systems)—Operating conditions.* Diaphragms or bellows for pressure measuring systems (except differential measuring systems) shall be delivered for use only under the operating conditions specified in List A, paragraphs 1 or 2.

(5) *Sockets, wells, protecting tubes, sheaths and target tubes.* The operating temperatures specified below shall be deemed part of the operating conditions for purposes of certification:

(i) *Operating temperature up to 1,400° F.*—(a) *Operating conditions.* When used under operating temperatures up to 1,400° F., sockets, wells, protecting tubes, sheaths and target tubes shall be delivered for use only under the operating conditions specified in List A, paragraphs 1 (a) to 1 (k) inclusive, paragraph 2, or paragraph 3 (b) or 3 (c), or on aircraft.

(b) *Specifications.* The total nickel and chromium alloy content of sockets, wells, protecting tubes, sheaths and target tubes shall not exceed 30%, or 20% of either nickel or chromium: *Provided, however,* That for use under operating conditions specified in List A, paragraph 1 (f) or 1 (k) the total nickel and chromium alloy content shall not exceed 80%, and maximum nickel and chromium content of not over 65% and 30%, respectively.

(ii) *Operating temperatures from 1,401° F. to 1,900° F.—Specifications.* The total nickel and chromium alloy content of sockets, wells, protecting tubes, sheaths and target tubes, used under operating temperatures from 1,401° F. to 1,900° F. shall not exceed

2%, and the nickel and chromium contents shall not exceed 35% and 28%, respectively: *Provided, however,* That for use under the operating conditions specified in List A, paragraphs 1 (f) or 1 (k) the total nickel and chromium alloy content shall not exceed 80%, and maximum nickel and chromium content of not over 65% and 30%, respectively.

(iii) *Operating temperatures of 1,901° F. and above—(a) Operating conditions.* When used under operating temperatures of 1,901° F. and above, sockets, wells, protecting tubes and sheaths shall only be delivered for use under the operating conditions specified in List A, paragraphs 1 (f) or 1 (k). Target tubes may be delivered for use under any conditions.

(b) *Specifications.* Sockets, wells, protecting tubes, sheaths and target tubes employed under the operating conditions specified in (a) above shall contain a maximum total nickel and chromium alloy content not to exceed 80%, and maximum nickel and chromium content of not over 65% and 30%, respectively.

(6) *Temperature bulbs (fluid filled tube system type)*—(i) *Operating conditions.* When used without sockets or protecting tubes, temperature bulbs (fluid filled tube system type) may be delivered for use only under the operating conditions specified in List A, paragraphs 1, 2, 3 (b) or 3 (c).

(ii) *Specifications.* The total nickel and chromium alloy content of temperature bulbs (fluid filled tube system type) shall not exceed 30%, or 20% of either nickel or chromium. No nickel, chromium, or alloy thereof, shall be used in temperature bulbs (except for mercury filled systems) when such bulbs are used in a socket or in protecting tubes. When used with a mercury filled system in a socket, temperature bulbs shall be manufactured from S. A. E. 4140 or alternate steels of no greater chromium alloy content and containing no more than 0.60% nickel.

(7) *Bushings and revolving or coupling nuts—Operating conditions.* Bushings and revolving or coupling nuts shall be delivered for use only under the operating conditions specified in List A, paragraphs 1 or 2.

(8) *Flexible and rigid extension stems for temperature bulbs*—(i) *Operating conditions.* When used with temperature bulbs without separable sockets or protecting tubes, flexible or rigid extension stems shall be delivered for use only under the operating conditions specified in List A, paragraph 1, 2, 3 (b) or 3 (c).

(ii) *Specifications.* The total nickel and chromium alloy content of such stems shall not exceed 30%, or 20% of either nickel or chromium.

(9) *Contact rods for flame control—Specifications.* The alloy content of contact rods for flame control, including contiguous brackets or clamps, shall not exceed 80% nickel and 20% chromium.

(10) *Thermocouples.* The operating temperatures specified below shall be deemed part of the operating conditions for purposes of certification.

(i) *Operating temperatures up to 800° F.—Specifications.* Where used in temperature ranges up to and including 800° F., the thermocouple wire alloy content shall not exceed 46% nickel, and the size of the wire shall not exceed #14 B and S gage.

(ii) *Operating temperatures from 801° F. to 1,400° F.—Specifications.* Where used in temperature ranges between 801° F. and 1,400° F., inclusive, the thermocouple wire alloy content shall not exceed 46% nickel, and the size of the wire shall not exceed #8 B and S gage, or as an alternate, the thermocouple wire alloy content shall not exceed 95% nickel or 20% chromium in either wire, and the size of the wire shall not exceed #14 B and S gage.

(iii) *Operating temperatures from 1,401° F. to 2,050° F.—Specifications.* Where used in temperature ranges between 1,401° F. and 2,050° F., inclusive, the thermocouple wire chromium alloy content shall not exceed 20% chromium in either wire, and the size of the wire shall not exceed #8 B and S gage.

(iv) *Operating temperatures of 2,051° F. and above—(a) Operating conditions.* When used in temperature ranges of 2,051° F. and above, thermocouple wire shall be delivered for use only under the operating conditions specified in List A, paragraphs 1 (f) or 1 (k).

(b) *Specifications.* The size of the wire shall be limited to No. 2 B and S gage or smaller when used under the operating conditions in List A, paragraph 1 (f), and shall be limited to No. 8 B and S gage or smaller when used under the operating conditions of List A, paragraph 1 (k).

(v) *Special provisions for replacement.* Except with respect to size of extension lead wire when used with potentiometer type pyrometers, the limitations of subparagraphs (i), (ii), (iii) and (iv) shall not apply to replacements if the extension lead wire or parts required to recalibrate existing instruments are not available in the user's plant.

(11) *Extension lead wire*—(i) *Specifications.* Two conductor extension lead wires shall not exceed 46% nickel content and shall be manufactured in sizes not larger than #16 B and S gage; except that extension lead wire used with millivoltmeter type pyrometers shall be limited in size to #14 B and S gage. When used with KA2S thermocouples, which measure surface tube temperatures, the nickel and chromium alloy content shall not exceed 95% nickel and 20% chromium in either wire, and no wire shall be longer than necessary: *Provided, however,* That there shall be no limitation on the size of wire used on aircraft.

(12) *Safety shutters and switches for radiation pyrometers — Specifications.* The nickel or chromium alloy content of safety shutters for radiation pyrometers shall not exceed 20% each; except that this restriction does not apply to the nickel or chromium alloy content of switches for radiation pyrometers.

(13) *Liquid level float cages and flanges*—(i) *Operating conditions.* Liquid level float cages and flanges shall be delivered for use only under the operating conditions specified in List A, paragraphs 2 (a) and 3 (b).

(ii) *Specifications.* The total nickel and chromium alloy content shall not exceed 30%, or 20% of either nickel or chromium: *Provided, however,* That when used under the operating conditions of List A, paragraph 2 (a), the nickel and chromium alloy content shall not exceed that of the contiguous metal.

(14) *Liquid level floats and float rods*—(i) *Operating conditions.* Liquid level floats and float rods shall be delivered for use only under the operating conditions specified in List A, paragraphs 1, 2, or 3 (b).

(ii) *Specifications.* The total nickel and chromium alloy content shall not exceed 30%, or 20% of either nickel or chromium: *Provided, however,* That when used under the operating conditions of List A, paragraph 2 (a), the nickel or chromium alloy content shall not exceed that of the contiguous metal.

(15) *Liquid level expansion and immersion tubes—Operating conditions.* Liquid level expansion and immersion tubes shall be delivered for use only under the operating conditions specified in List A, paragraphs 1 or 2 or at temperatures of 400° F. and above.

(16) *Flow nozzles—Operating conditions.* Flow nozzles shall be delivered for use only in the presence of a flowing medium with a temperature in excess of 900° F.

(17) *Pitot tubes—Specifications.* No nickel, chromium or alloy thereof shall be used in the manufacture of pitot tubes, except when used on aircraft.

(18) *Orifice plates—Operating conditions.* Orifice plates shall be delivered for use only under the operating conditions specified in List A, paragraphs 1, 2, 3 (b) or 3 (c).

(19) *Orifice meter accessories—Specifications.* No nickel, chromium or alloy thereof shall be used in the manufacture of settling chambers, separating chambers or condensers.

(20) *Straightening vanes*—(i) *Operating conditions.* Straightening vanes shall be delivered for use only under the operating conditions specified in List A, paragraphs 1 or 3 (c) and their delivery shall be further limited to use in pipes having an internal diameter of 10 inches or less.

(ii) *Specifications.* The total nickel and chromium alloy contents shall not exceed 30%, or 20% of either nickel or chromium.

(21) *Cleanout valve trim and liners for use with Venturi tubes—Operating conditions.* Cleanout valve trim and liners for Venturi tubes shall be delivered for use only under the operating conditions specified in List A, paragraphs 1, 2, 3 (b) or 3 (c).

(22) *Venturi tubes — Specifications.* No nickel, chromium or alloy thereof shall be used in the manufacture of Venturi tubes.

(23) *Studs for differential pressure chambers—Specifications.* Studs for differential pressure chambers shall be manufactured from S. A. E. 4140 or alternate steels of no greater chromium alloy content and containing no more than 0.60% nickel.

(24) *Conductivity cells for measuring conductivity of fluids—Operating conditions.* Conductivity cells for measuring conductivity of fluids shall be delivered for use only under the operating conditions specified in List A, paragraphs 1 or 2.

(d) *Operating conditions and specifications for control valves and regulators.* Pursuant to the provisions of paragraph (b) hereof, the production and delivery

of the following control valves and regulators shall be governed by the following operating conditions and specifications.

(i) *Bodies, bonnets and blind flanges*—(a) *Operating conditions.* Bodies, bonnets and blind flanges shall be delivered for use only under the operating conditions specified in List A, paragraph 2 (a) and 3 (b).

(ii) *Specifications.* When used under operating conditions of List A, paragraph 3 (b) the total nickel and chromium alloy content shall not exceed 30%, or 20% of either nickel or chromium: *Provided, however,* That when used under the operating conditions of List A, paragraph 2 (a), the nickel and chromium alloy content shall not exceed that of the contiguous metal.

(2) *Inner valves and seat rings*—(i) *Operating conditions.* Inner valves and seat rings shall be delivered for use only under an operating pressure drop of 50 p. s. i. or more, or under the operating conditions specified in List A, paragraphs 1 or 2.

(ii) *Specifications.* When used under operating conditions of a pressure drop of 50 p. s. i. or more, the flow cutting surface shall be made of carbon steel, faced, where practicable, with a chromium or nickel alloy not in excess of $\frac{3}{32}$" finished thickness. When used under the operating conditions specified in List A, paragraphs 1 or 2, the total nickel and chromium alloy content shall not exceed 30%, or 20% of either nickel or chromium: *Provided, however,* That when used under the conditions of List A paragraph 2 (a) the nickel and chromium alloy content shall not exceed that of the contiguous metal.

(3) *Studs for valve bodies and flanges*—(i) *Operating conditions.* Studs for valve bodies and flanges may be used under any operating conditions; but certification shall be required for use under the operating conditions of List A, paragraph 3 (b) or 3 (d).

(ii) *Specifications.* Studs for valve bodies and flanges shall be manufactured from S. A. E. 4140 or alternate steels of no greater chromium alloy content and containing no more than 0.60% nickel: *Provided, however,* That where used under the operating conditions specified in List A, paragraphs 3 (b) or 3 (d) the total nickel and chromium alloy content shall not exceed 30%, or 20% of either nickel or chromium.

[Subparagraph (4) revoked January 30, 1943.]

(5) *Stems, bushings and guiding surfaces for control valves, and regulators—Specifications.* The total nickel and chromium alloy content of stems, bushings, and guiding surfaces for control valves and regulators shall not exceed 30%, or 20% of either nickel or chromium.

(e) *Ninety-day exemption of Army, Navy, and Maritime Commission.* The provisions of this order shall not apply to deliveries to and for the use of the Army, Navy, or Maritime Commission until August 26, 1942. As used in this paragraph, the terms "Army," "Navy," and "Maritime Commission" shall not include any privately operated plant or shipyard, financed or controlled by any of these organizations, or operated on a cost-plus-fixed-fee basis.

(f) *Appeals.* Any person affected by this order who considers that compliance therewith would work an exceptional and unreasonable hardship upon him may appeal to the War Production Board setting forth the pertinent facts and the reasons he considers he is entitled to relief. The Director General for Operations may thereupon take such action as he deems appropriate.

(g) *Communications to War Production Board.* All reports required to be filed hereunder, and all communications concerning this order, shall, unless otherwise directed, be addressed to: War Production Board, General Industrial Equipment Division, Washington, D. C., Ref.: L–134.

(h) *Violations.* Any person who wilfully violates any provision of this order, or who wilfully furnishes false information to the Director General for Operations in connection with this order is guilty of a crime and upon conviction may be punished by fine or imprisonment. In addition, any such person may be prohibited from making or obtaining further deliveries of, or from processing or using material under priority control and may be deprived of priorities assistance by the Director General for Operations.

(i) *Records and reports.* All manufacturers affected by this order shall keep and preserve for not less than two years accurate and complete records concerning production, deliveries, and orders for industrial instruments.

All persons affected by this order shall execute and file with the Director General for Operations, War Production Board, such reports and questionnaires as said Director General for Operations shall from time to time request.

Issued this 30th day of January 1943.

CURTIS E. CALDER,
Director General for Operations.

LIST A

PARAGRAPH 1. When exposed to:

(a) Nitric acid (dilute or concentrated).
(b) Coke oven gas.
(c) Blast furnace gas.
(d) Sulphurous gases.
(e) Steam above 200 p. s. i. or 400° F.
(f) Molten metal baths.
(g) Sulphuric or hydrochloric acids.
(h) Sour gas and vapors, and liquids contaminated with sour gas and vapors.
(i) Hydrofluoric acid.
(j) Salt brine in crude petroleum.
(k) Salt baths containing nitrates, chlorides, cyanides, or fluorides.

PAR. 2. (a) When contiguous metal coming in contact with the processed medium at the point of measurement or control is also a nickel or chromium alloy.

(b) When contiguous surfaces coming in contact with the processed medium at the point of measurement or control are nonmetallic but no protection other than that containing nickel or chromium will withstand the corrosive medium.

(c) In the production of synthetic rubber when an explosive hazard due to chemical reaction cannot otherwise be avoided, or where acetic acid has a corrosive effect on seating, guiding, and measuring surfaces.

(d) When no other material can be substituted without contaminating the material being processed.

PAR. 3. When the fluid to which the part is to be subject is under:

(a) Static pressure of 250 pounds per square inch or more;

(b) Temperature of 750° F. and above, or minus 20° F. and below;

(c) Normal pipe velocity of 5,000 ft. per minute or more for gases or vapors; or 300 ft. per minute or more for liquids;

(d) Temperature of minus 250° F. to minus 20° F. inclusive, and from 400° F. to 1,250° F. inclusive, and 400 p. s. i. to 2,500 p. s. i. inclusive.

L-144

PART 1261—LABORATORY EQUIPMENT

[General Limitation Order L–144, as Amended June 26, 1943]

Section 1261.1 *General Limitation Order L–144* is hereby amended to read as follows:

§ 1261.1 *General Limitation Order L–144*—(a) *Definitions.* For the purposes of this order:

(1) "Laboratory equipment" means any apparatus, instrument, appliance, device, equipment, or part thereof, designed primarily for use in laboratories. The term shall include furniture designed for laboratory use but shall not include second-hand equipment of any kind nor any chemical prepared and packed for reagent use.

(2) "Distributor" means any person who purchases laboratory equipment for the purpose of resale.

(3) "Serial-numbered laboratory" means any laboratory which has been assigned a serial number under Preference Rating Order P–43. (Any serial-numbered laboratory shall indicate its serial number on any purchase order which it places for laboratory equipment.)

(b) *Restrictions on the sale and delivery of laboratory equipment.* (1) No person shall sell or deliver any item of laboratory equipment included on List A of this order to any person, other than a distributor, except to fill a purchase order or contract specifically authorized by the War Production Board on Form WPB-1414 (formerly Form PD–620).

(2) In addition to the restrictions set forth in subparagraph (1) of this paragraph (b), no person shall sell or deliver, on any one purchase order or contract, any one item of laboratory equipment having a value of $50 or more, or any quantity of the same item of laboratory equipment having an aggregate value of $50 or more, or any quantity of different items of laboratory equipment having an aggregate value of $200 or more, except to fill purchase orders or contracts calling for delivery to any of the following persons:

(i) The Army or Navy of the United States.

(ii) Any serial-numbered laboratory.

(iii) Any distributor.

(iv) Any other person who has received specific authorization of the War Production Board on Form WPB–1414, covering the specific purchase order or contract.

No purchase order or contract shall be subdivided for the purpose of avoiding the restrictions of this paragraph (b) (2). For the purpose of this paragraph, items shall be deemed to be the "same" when they are identical except for minor manufacturing tolerances. For example, glass beakers of identical size and shape (except for minor manufacturing tolerances) are the "same item", whereas glass beakers of different size or shape are "different items".

(c) *Restrictions on purchase of laboratory equipment.* No person shall purchase or accept delivery of any laboratory equipment, if he knows or has reason to believe that the sale or delivery of such laboratory equipment is prohibited by the terms of paragraph (b) of this order.

(d) *Authorizations on Form WPB–1414 and extensions of such authorizations.* (1) Each person seeking authorization, pursuant to paragraph (b) of this order, to receive laboratory equipment shall prepare Form WPB–1414 in the manner prescribed therein and shall file such form with the War Production Board, Washington, D. C., Ref: L–144. (Copies of Form WPB–1414 may be obtained at the local offices of the War Production Board.)

(2) Any person receiving specific authorization on Form WPB–1414 shall notify his supplier of such authorization by furnishing him with a certification in substantially the following form (on the purchase order or contract, or on an attached document):

The undersigned hereby certifies that he has been specifically authorized by the War Production Board on Form WPB–1414, Case No. ------, to receive the laboratory equipment ordered by the within (or attached) purchase order or contract, in accordance with the provisions of Limitation Order L–144.

Name----------

By----------

Authorized official

Date----------

Any such certification shall be signed by an authorized official, either manually or as provided in Priorities Regulation 7, and shall constitute a representation to the supplier and to the War Production Board of the facts certified therein. The supplier may rely upon such representation, unless he knows or has reason to believe such representation to be false.

(e) *Assignment of preference ratings on Form WPB–1414.* In conjunction with the granting of specific authorizations to receive laboratory equipment on Form WPB–1414 pursuant to paragraph (b) of this order, the War Production Board may also assign preference ratings to the authorized deliveries on such form. Any preference rating so assigned shall be applied and extended only in accordance with the terms of Priorities Regulation 3.

(f) *Records.* All persons affected by this order shall keep and preserve for not less than two years accurate and complete records of all sales, deliveries and purchases of laboratory equipment.

(g) *Applicability of regulations.* This order and all transactions affected thereby are subject to all applicable regulations of the War Production Board, as amended from time to time.

(h) *Appeals.* Any appeal from the provisions of this order shall be made by filing a letter in triplicate, referring to the particular provision appealed from and stating fully the grounds of the appeal.

(i) *Violations and false statements.* Any person who wilfully violates any provision of this order, or who, in connection with this order, wilfully conceals a material fact or furnishes false information to any department or agency of the United States is guilty of a crime and upon conviction may be punished by fine or imprisonment. In addition, any such person may be prohibited from making or obtaining further deliveries of, or from processing or using, material under priority control and may be deprived of priorities assistance.

(j) *Communications with the War Production Board.* All reports to be filed hereunder and communications concerning this order shall, unless otherwise directed, be addressed to the War Production Board, Safety and Technical Equipment Division, Washington, D. C., Ref: L–144.

Issued this 26th day of June 1943.

WAR PRODUCTION BOARD,
By J. JOSEPH WHELAN,
Recording Secretary.

LIST A

This list includes only those items coming within the classifications set forth below which have a value, individually, of $50 or more. Any item coming within the classifications set forth below which has a value, individually, of less than $50 shall not be regarded as being included on List A.

Analytical balances.
Centrifuges.
Electroanalysis apparatus.
Gas analysis apparatus.
High vacuum pumps.
Hydrogen ion equipment (electrometric).
Laboratory incubators.
Laboratory ovens.
Laboratory water stills.
Metalloscopes.
Microscopes and attachments.
Microtomes and attachments.
Potentiometric and conductivity apparatus.
Refractometers.
Spectro and spectrophotometric analytical apparatus.
Viscosimeters.

L-144 Interpretation

PART 1261—LABORATORY EQUIPMENT

[Interpretation 1 of General Limitation Order L–144, as Amended]

The word "distributor", wherever it appears in Order L–144 [§ 1261.1] includes only distributors located in the United States, its territories or possessions. The order permits delivery to "distributors" without requiring specific authorization on Form WPB–1414 (formerly PD–620). The purpose of this provision is to eliminate the necessity of double authorizations on the sale of equipment from producer to distributor followed by resale from distributor to user. It was contemplated, however, that the distributors would be reselling either to the Army or Navy or serial-numbered laboratories, or to other persons who had received specific authorization on Form WPB–1414; and therefore the War Production Board would have control over the ultimate disposition of the equipment. In the case of sales to distributors in foreign countries, the War Production Board has no control over sales by the distributor to the ultimate user. For this reason distributors in foreign countries must receive specific authorization on Form WPB–1414, just as in the case of any other foreign purchaser.

Issued this 17th day of July 1943.

WAR PRODUCTION BOARD,
By J. JOSEPH WHELAN,
Recording Secretary.

L-151

TITLE 32—NATIONAL DEFENSE

Chapter IX—War Production Board

Subchapter B—Director General for Operations

PART 1278—DOMESTIC WATTHOUR METERS

[General Limitation Order L–151]

The fulfillment of requirements for the defense of the United States has created a shortage in the supply of certain materials, used in the production of domestic watthour meters, for defense, for private account and for export; and the following order is deemed necessary and appropriate in the public interest and to promote the national defense.

§ 1278.1 *General Limitation Order L–151.*—(a) *Definitions.* For the purpose of this order:

(1) "Person" means any individual, partnership, association, business trust, corporation, governmental corporation or agency, or any organized group of persons, whether incorporated or not.

(2) "Domestic watthour meter" means any device designed and manufactured for the purpose of measuring the consumption of electrical power with respect to time, and includes single phase, two and three wire types, with capacities up to 25 amperes and voltages up to 240 volts, for use on alternating current of any frequency. The term does not include electric power meters for use on direct current or on polyphase circuits, maximum demand meters, or integrating meters, calibrated in terms other than electric power (i. e. meters integrating weight, pressure, etc.)

(3) "Manufacture" means the production, fabrication or assembly of any domestic watthour meters.

(b) *Prohibition of production.* On and after September 26, 1942, regardless of the terms of any order, contract of sale, or purchase, or other commitment, or of any preference rating certificate, or blanket preference rating order, no person shall manufacture any domestic watthour meters or accept delivery of any raw material, semi-fabricated or fabricated parts for incorporation into any domestic watthour meters.

(c) *Restrictions on production until the date of prohibition.* During the period

beginning on the date of issuance of this order and ending September 25, 1942, no person shall manufacture a number of domestic watthour meters in excess of 2½ percent of the aggregate number of domestic watthour meters manufactured by such person during the calendar year 1941.

(d) *Restrictions on delivery.* (1) Regardless of the terms of any order, contract of sale or purchase, or other commitment, or of any preference rating certificate, or blanket preference rating order, no person shall deliver, and no person shall accept delivery of any domestic watthour meters except:

(i) Pursuant to an order for domestic watthour meters by and for the use of the Army, Navy, Maritime Commission, or War Shipping Administration;

(ii) Pursuant to an order bearing a preference rating assigned by Preference Rating Order P–46, as amended;

(iii) Pursuant to an order accompanied by a specific authorization of the Director General for Operations as provided in paragraph (d) (2);

Provided, however, That the provisions of this paragraph (d) (1) shall not apply to domestic watthour meters in the hands of a common or contract carrier, on the date of issuance of this order, for delivery to a purchaser.

(2) Application for the authorization of the Director General for Operations required by the provisions of paragraph (d) (1) (iii) above may be made by the purchaser by furnishing to the War Production Board a statement supplying in detail the following information:

(i) The names of the purchaser and seller,

(ii) The purchaser's inventory of domestic watthour meters

(iii) The number of units for which authorization is requested,

(iv) The purpose for which the meters are to be used by the purchaser and their relation to military needs, war production, public health and safety.

Authorization will, if advisable, be granted on Form PD–423, which form shall be retained by the manufacturer.

(e) *Parts for repairs and maintenance.* The provisions of this order restricting or prohibiting the manufacture, delivery or acquisition of domestic watthour meters shall not apply to the manufacture, delivery or acquisition of parts for repair or maintenance of domestic watthour meters: *Provided, however,* That no person shall manufacture repair or maintenance parts to the extent that such production will result in such person acquiring an inventory of such parts in excess of his average monthly inventory thereof during the calendar year of 1941.

(f) *Miscellaneous provisions.*—(1) *Records and reports.* All persons affected by this order shall keep and preserve for not less than two years, accurate and complete records concerning inventories, production and sales. All persons affected by this order shall execute and file with the War Production Board, such reports and questionnaires as the War Production Board shall from time to time require. Not later than 15 days after the date of issuance of this order, and thereafter on the tenth day of each succeeding calendar month, each manufacturer shall file a report, in quadruplicate, in letter form showing:

(i) His inventory of domestic watthour meters on hand as of the first day of the calendar month in which such report is filed;

(ii) His deliveries of domestic watthour meters during the preceding month; and

(iii) His unfilled orders, scheduled for delivery during the current and succeeding months;

Provided, however, That no such report need be made of deliveries of or unfilled orders for maintenance and repair parts.

(2) *Violations.* Any person who wilfully violates any provisions of this order, or who wilfully furnishes false information to the Director General for Operations in connection with this order is guilty of a crime and upon conviction may be punished by fine or imprisonment. In addition, any such person may be prohibited from making or obtaining further deliveries of, or from processing or using material under priority control and may be deprived of priorities assistance by the Director General for Operations.

(3) *Appeals.* Any person affected by this order who considers that compliance therewith would work an exceptional and unreasonable hardship upon him may appeal to the Director General for Operations, setting forth the pertinent facts and the reasons he considers he is entitled to relief. The Director General for Operations may thereupon take such action as he deems appropriate.

(4) *Communications.* All reports required to be filed hereunder, and all communications concerning this order, shall, unless otherwise directed, be addressed to: War Production Board Washington, D. C. Ref.: L–151. (P.D. Reg. 1, as amended, 6 F.R. 6680; W.P.B. Reg. 1, 7 F.R. 561; E.O. 9024, 7 F.R. 329; E.O. 9040, 7 F.R. 527; E.O. 9125, 7 F.R. 2719; sec. 2 (a), Pub. Law 671, 76th Cong., as amended by Pub. Laws 89 and 507, 77th Cong.)

Issued this 31st day of July 1942.

AMORY HOUGHTON,
Director General for Operations.

L-154

TITLE 32—NATIONAL DEFENSE
CHAPTER IX—WAR PRODUCTION BOARD
SUBCHAPTER B—DIVISION OF INDUSTRY OPERATIONS
PART 1288—POWER, STEAM AND WATER AUXILIARY EQUIPMENT

Limitation Order No. L-154

The fulfillment of requirements for the defense of the United States has created a shortage in the supply of iron, steel, brass, bronze and other critical materials for defense, for private account, and for export; and the following Order is deemed necessary and appropriate in the public interest and to promote the national defense:

§ 1288.1 *Limitation Order No. L-154.*

(a) *Definitions.* For the purpose of this Order and all Schedules issued pursuant thereto:

(1) "Person" means any individual, partnership, association, business trust, corporation, governmental corporation or agency or any organized group of persons, whether incorporated or not.

(2) "Required Specifications" includes requirements to standardize the types, sizes, models, or forms of, or the specifications for power, steam and water auxiliary equipment.

(3) "Restrictions on Materials" includes requirements to eliminate, reduce or conserve the use of critical materials in the production of power, steam and water auxiliary equipment; and requirements to substitute less critical for more materials in the production of such equipment.

(b) *Issuance of Schedules of Required Specifications and Restrictions on Materials.* The Director of Industry Operations may from time to time issue Schedules establishing Required Specifications and Restrictions on Materials with respect to the production of any power, steam and water auxiliary equipment. On and after the effective date of any such Schedule, no power, steam or water auxiliary equipment affected thereby shall be produced, fabricated or accepted except in accordance with the terms of such Schedule.

(c) *Appeals.* Any person affected by this Order or any Schedule issued pursuant thereto who considers that compliance therewith would work an exceptional and unreasonable hardship upon him, or that it would result in a serious problem of unemployment in the community, or that compliance with this Order or such Schedule would disrupt or impair a program of conversion from non-war to war work, may apply for relief by addressing a letter to the War Production Board setting forth the pertinent facts and the reasons why such person considers that he is entitled to relief. The Director of Industry Operations may thereupon take such action as he deems appropriate.

(d) *Applicability of Priorities Regulation No. 1.* This Order (and any Schedule issued pursuant thereto) and all transactions affected thereby are subject to the provisions of Priorities Regulation No. 1 (Part 944), as amended from time to time, except to the extent that any provision hereof may be inconsistent therewith, in which case the provisions of this Order (or such Schedule) shall govern.

(e) *Communications to War Production Board.* All reports required to be filed hereunder, and all communications concerning this Order, shall, unless otherwise directed, be addressed to:

"War Production Board
Washington, D. C., Ref: L-154"

(f) *Violations.* Any person who wilfully violates any provision of this Order, or who, in connection with this Order, wilfully conceals a material fact or furnishes false information to any department or agency of the United States is guilty of a crime, and upon conviction may be punished by fine or imprisonment. In addition, any such person may be prohibited from making or obtaining further deliveries of, or from processing or using, material under priority control and may be deprived of priorities assistance.

(P.D. Reg. 1, as amended, 6 F.R. 6680; W.P.B. Reg. 1, 7 F.R. 561; E.O. 9024, 7 F.R. 329; E.O. 9040, 7 F.R. 527; E.O. 9125, 7 F.R. 2719; sec. 2(a), Pub. Law 671, 76th Cong., as amended by Pub. Laws 89 and 507, 77th Cong.)

Issued this 17th day of June, 1942.

J. S. KNOWLSON
Director of Industry Operations

L-154 Schedule I

PART 1288—POWER, STEAM AND WATER AUXILIARY EQUIPMENT

[Schedule I to Limitation Order L-154 [1]]

WATER METERS

§ 1288.2 *Schedule I to Limitation Order L-154*—(a) *Definitions.* For the purposes of this schedule:

(1) "Producer" means any person who produces, manufactures, processes, fabricates, or assembles water meters.

(2) "Water meter" means any meter for measuring cold (under 100 degrees Fahrenheit) water for any purpose, except chemical or marine applications.

(3) "Copper base alloy" means any alloy which contains 40% or more copper by weight.

(b) *Restrictions on materials.* The following restrictions on materials are hereby established for the manufacture of water meters:

(1) No producer shall manufacture, process, finish, or assemble any water meters if they contain:

(i) Copper or copper base alloys in the main case or casings, the external bolts, nuts, and washers, the register boxes and lids, the upper and lower plates or cages, and the dials;

(ii) Stainless steel or nickel alloys;

(iii) Tin in coatings.

(2) Nothing herein contained shall prevent the delivery of water meters assembled and finished on June 17, 1942.

(c) *Conservation Order M-9-c.* From and after June 17, 1942, the provisions of Conservation Order M-9-c shall no longer apply to the manufacture of water meters.

(d) *Exceptions.* (1) Nothing in this schedule shall be construed to restrict the manufacture, processing or finishing of any article or product by or through a prime contractor or subcontractor for the account of the Army, Navy or Maritime Commission in accordance with the specifications, including performance specifications, of the prime contract.

(2) Nothing in this schedule shall prevent the manufacture, processing, finishing or assembly of water meters, after the 21st day of July, 1942, by any producer by the use of not more than sixty percent by weight of such producer's inventory of parts and material on hand on July 1, 1942, provided, however, that the number of water meters so manufactured, processed, finished or assembled by any producer shall not exceed twelve and one-half percent of the number of water meters shipped by such producer during the twelve months ending May 31, 1942.

[1] For the convenience of users, this order and its amendment are assembled herewith into one document. It includes Schedule I to L-154, issued June 17, 1942, and Amendment No. 1 of Schedule I to L-154, issued July 24, 1942.

L-154 Amendment 1 to Schedule I—Water Meters

TITLE 32—NATIONAL DEFENSE

Chapter IX—War Production Board

Subchapter B—Director General for Operations

PART 1288—POWER, STEAM AND WATER AUXILIARY EQUIPMENT

[Amendment 1 to Schedule I—Limitation Order L-154]

WATER METERS

Paragraph (d) of § 1288.2 Schedule I to *Limitation Order L-154* is hereby amended to read as follows:

(d) *Exceptions.* (1) Nothing in this schedule shall be construed to restrict the manufacture, processing or finishing of any article or product by or through a prime contractor or subcontractor for the account of the Army, Navy or Maritime Commission in accordance with the specifications, including performance specifications, of the prime contract.

(2) Nothing in this schedule shall prevent the manufacture, processing, finishing or assembly of water meters, after the 21st day of July, 1942, by any producer by the use of not more than sixty percent by weight of such producer's inventory of parts and material on hand on July 1, 1942, provided, however, that the number of water meters so manufactured, processed, finished or assembled by any producer shall not exceed twelve and one-half percent of the number of water meters shipped by such producer during the twelve months ending May 31, 1942.

(P.D. Reg. 1, as amended, 6 F.R. 6680; W.P.B. Reg. 1, 7 F.R. 561; E.O. 9024, 7 F.R. 32; E.O. 9040, 7 F.R. 527; E.O. 9125, 7 F.R. 2719; sec. 2 (a), Pub. Law 671, 76th Cong., as amended by Pub. Laws 89 and 507, 77th Cong.)

Issued this 24th day of July 1942.

AMORY HOUGHTON,
Director General for Operations.

L-154 Schedule VI

PART 1288—POWER, STEAM, AND WATER AUXILIARY EQUIPMENT

[Schedule VI to Limitation Order L-154]

AUXILIARY EQUIPMENT AND APPURTENANCES FOR STEAM TURBINES FOR LAND USE

§ 1288.7 *Schedule VI to Limitation Order L-154*—(a) *Definitions.* For the purpose of this schedule, "producer" means any person who produces, manufactures, processes, fabricates, or assembles steam turbines for land use.

(b) *Required specifications.* No producer shall install or deliver for installation on any steam turbine designed for land use any of the following items of equipment or appurtenances:

(1) Sheet metal lagging;

(2) Asbestos, plastic or other high temperature molded insulation, except that manufacturers may provide materials (other than asbestos blanket type) for application after erection of the turbine on its permanent foundation;

(3) Ornamental trim;

(4) Gage equipment larger than the following:

(i) Steam gages, 6 inches in diameter (initial pressure, first stage pressure, exhaust pressure);

(ii) Oil pressure gages larger than 4½ inches in diameter;

(iii) Gland water pressure gages larger than 4½ inches in diameter if glands are of the water seal type;

(iv) Any gage larger than the minimum practicable size.

(5) Duplicate gages or other instruments;

(6) Pipe or tubing for oil piping or steam condensate piping, except for metering purposes, which is monel metal or contains 40 per cent or more copper by weight;

(7) More than a single main oil cooler;

(8) More than a single full capacity auxiliary oil pump other than pumps for turning gears and hydrogen cooling equipment.

(9) Special materials and features not customarily furnished by the manufacturer for the conditions under which the turbine is to operate.

Issued this 28th day of July 1943.

WAR PRODUCTION BOARD,
By J. JOSEPH WHELAN,
Recording Secretary.

L-175

TITLE 32—NATIONAL DEFENSE

Chapter IX—War Production Board

Subchapter B—Director General for Operations

PART 3028—RAILROAD STANDARD WATCHES

[General Limitation Order L-175]

The fulfillment of requirements for the defense of the United States has created a shortage in the supply of railroad standard watches for defense, for private account and for export; and the following order is deemed necessary and appropriate in the public interest and to promote the national defense:

§ 3028.1 *General Limitation Order L-175*—(a) *Definitions.* For the purposes of this Order:

(1) "Railroad standard watch" means any spring-driven time piece, designed primarily for use by a railroad time service employee, including but not limited to those watches enumerated in Schedule A.

(2) "New railroad standard watch" means any railroad standard watch which has never been used by an ultimate consumer.

(3) "Manufacturer" means any person engaged in the business of manufacturing or assembling railroad standard watches.

(4) "Dealer" means any person (other than a manufacturer) engaged in the business of selling new railroad standard watches at retail to the public.

(5) "Wholesaler" means any person engaged in the business of selling new railroad standard watches to dealers for resale.

(b) *Restrictions on the transfer of new railroad standard watches.* No manufacturer shall sell, deliver or in any other way transfer the physical posses-

sion of, or title to, any new railroad standard watch, except

(1) In fulfillment of any contract, subcontract or purchase order placed by or for the account of the United States Army for new railroad standard watches to be used by the Army and not for resale;

(2) In fulfillment of any purchase order or contract, accompanied by the following certification (which shall constitute a representation by each person signing it to the seller and to the War Production Board) signed by both a railroad division superintendent and the time service employee who desires to acquire such a watch:

---------- is a Time Service Employee of the ---------- Railroad Company, is employed on the ---------- Division of the ---------- Railroad Company, ----------
(Street)
----------, ----------
(City) (State)

is required by such Railroad Company to carry a Railroad Standard Watch in the performance of his duties and has no watch capable of meeting these requirements.

(Signed) ----------
Time Service Employee

Position

(Signed) ----------
Railroad Division Superintendent.

(3) or in fulfillment of any purchase order or contract placed with him by a dealer or wholesaler accompanied by a certification (which shall constitute a representation to the manufacturer and to the War Production Board) in the following form:

The railroad standard watches included in this order are required to replace in my inventory an equal number of such watches sold pursuant to purchase orders which I have received (or which ---------- of ---------- has certified on an order placed with me that he has received) from time service employees of railroads accompanied by certificates in the form prescribed in paragraph (b) (2) of Limitation Order No. L-175.

Company
By ----------
Officer

Title

(c) *Records.* Each manufacturer, wholesaler and dealer shall keep and preserve, for not less than two years, complete records of his inventories and sales of railroad standard watches.

(d) *Audit and inspection.* All records required to be kept by this order shall, upon request, be submitted to audit and inspection by duly authorized representatives of the War Production Board.

(e) *Violations.* Any person who wilfully violates any provision of this order, or who, in connection with this order, wilfully conceals a material fact or furnishes false information to any department or agency of the United States, is guilty of a crime, and upon conviction may be punished by fine or imprisonment. In addition, any such person may be prohibited from making or obtaining further deliveries of or from processing or using material under priority control and may be deprived of priorities assistance.

(f) *Reports.* All persons affected by this order shall execute and file with the War Production Board such reports and questionnaires as said Board shall, from time to time, request.

(g) *Communications.* All reports required to be filed hereunder and all communications concerning this order shall, unless otherwise directed, be addressed to: War Production Board, Washington, D. C., Ref: L-175. (P.D. Reg. 1, as amended, 6 F.R. 6680; W.P.B. Reg. 1, 7 F.R. 561; E.O. 9024, 7 F.R. 329; E.O. 9040, 7 F.R. 527; E.O. 9125, 7 F.R. 2719; sec. 2 (a), Pub. Law 671, 76th Cong., as amended by Pub. Laws 89 and 507, 77th Cong.)

Issued this 7th day of August 1942.

AMORY HOUGHTON,
Director General for Operations.

SCHEDULE A

Waltham watches	16 size "Vanguard", 23 Jeweled, Bridge Model, Double Roller.
	16 size "Crescent St.", Jeweled, Bridge Model, Double Roller.
	16 size "Riverside", 19 Jeweled, Bridge Model, Double Roller.
	16 size No. 645, 21 Jewels, Bridge Model, Double Roller.
Elgin watches	16 size "Veritas", 23 Jewels, three-quarter plate, Double Roller.
	16 size "Father Time", Jeweled, three-quarter plate, Double Roller.
	16 size "B. W. Raymond", Jeweled, three-quarter plate, Double Roller.
Hamilton watches	16 size No. 950, 23 Jewels, Bridge Model, Double Roller.
	16 size No. 992, 21 Jewels, three-quarter plate, Double Roller.
	16 size No. 996, 19 Jewels, three-quarter plate, Double Roller.
Ball watches	16 size "Official R. R. Standard", 19, 21, and 23 Jeweled, Double Roller.

GPO—WPB 390—p. 1

L-183-a

PART 3037—ELECTRONIC EQUIPMENT

[General Limitation Order L-183-a as Amended May 10, 1943]

The fulfillment of requirements for the defense of the United States has created a shortage in the supply of electronic equipment for defense, for private account and for export; and the following order is deemed necessary and appropriate in the public interest and to promote the national defense:

§ 3037.2 *General Limitation Order L-183-a*—(a) *Definitions.* For the purpose of this order:

(1) "Person" means any individual, partnership, association, business trust, corporation or any organized group of individuals whether incorporated or not.

(2) "Electronic equipment" means:

(i) Any electrical apparatus or device used for communications, detection or signalling, and involving the use of vacuum or gaseous tubes;

(ii) Electrical or wire communications equipment used for communications, detection or signalling which has been assigned a numerical designation of urgency by the Precedence List;

(iii) Wire communication equipment for telephone and telegraph; and

(iv) Research, production or maintenance test equipment for any of the foregoing equipment.

The term does not include any fabricated or semi-fabricated part or component of or for electronic equipment.

(3) "Producer" means any person to the extent engaged in the production, manufacture or assembly of electronic equipment.

(4) "Component" means any fabricated or semi-fabricated part of or for electronic equipment.

(5) "Supplier" means any person to the extent engaged in the production, fabrication or assembly of components.

(6) "Precedence list" is the schedule, issued and amended from time to time by the Joint Communications Board of the Army and Navy, which sets forth by numerical designation the relative urgency of deliveries of certain types and quantities of electronic equipment to or for the account of:

(i) The Army or Navy of the United States, the United States Maritime Commission, the War Shipping Administration, the Panama Canal, the Coast Guard, the Office of Scientific Research and Development, and the Civil Aeronautics Administration; or

(ii) The government of any of the following countries: Belgium, China, Czechoslovakia, Free France, Greece, Iceland, the Netherlands, Norway, Poland, Russia, Turkey, United Kingdom including its dominions, Crown Colonies and Protectorates, and Yugoslavia; or

(iii) Any other country including those of the Western Hemisphere now or hereafter designated, pursuant to the Act of March 11, 1941, entitled "An Act to Promote the Defense of the United States" (Lend-Lease Act).

The order of urgency established by this list is:

P/L-A1
P/L-A1a, etc.
P/L-A2, etc.
P/L-B1, etc.; P/L-A1 being the highest urgency presently assigned.

(b) *Operation of the precedence list.* (1) The numerical designations assigned by the precedence list shall establish the relative urgency of certain deliveries of types and quantities of electronic equipment within any single preference rating category. Any delivery assigned a lower numerical designation in any preference rating category shall be deferred to the extent necessary to assure within the time specified those deliveries assigned higher designations within the same preference rating category even though such deferment may cause default in deliveries assigned lower designations.

(2) The assignment of a precedence list designation shall not affect production or delivery under any purchase order (including an order for electronic equipment or components thereof) which does not bear a precedence list designation. The sequence of deliveries among orders bearing no precedence list designation, and as between orders bearing no precedence list designations and orders bearing precedence list designations shall be determined pursuant to War Production Board regulations in accordance with the preference ratings which such orders respectively bear.

(3) Each producer shall review his production and delivery schedules for electronic equipment to which numerical designations have been assigned by the precedence list; and shall on and after February 15, 1943, schedule or reschedule within each preference rating category his production and delivery schedules of types and quantities of electronic equipment to which numerical designations of urgency have been assigned by the precedence list, in relation to each other only, and in accordance with such designations, so that, as to deliveries of those assigned lower designations, production shall be deferred to the extent necessary to assure those deliveries assigned higher designations, within the time specified.

(4) Each producer and supplier shall transmit in writing to his suppliers of components the following information:

(i) Name of the contracting agency or customer on the prime contract and the contract number applicable to the whole or any portion of each purchase order for components;

(ii) On each purchase order a definite monthly delivery schedule of the quantities of components actually required to support the production of the minimum quantities of electronic equipment as established by the precedence list, or to support the producer's authorized production of electronic equipment to which numerical designations of urgency have not been assigned by the precedence list, taking into account in his determination of such quantities the producer's current inventory of such components;

(iii) The producer's manufacturing lead factor in days for each component; and

(iv) The precedence list designations, if any, applicable to the whole or any portion of each purchase order for components, stating the percentage of each purchase order to which each precedence list designation applies.

The provisions of this paragraph (b) (4) shall apply to all purchase orders for components heretofore or hereafter placed by any producer or supplier.

(5) Each supplier to whom precedence list designations of urgency are transmitted may schedule or reschedule, within each preference rating category, all or any portion of his production or delivery schedules of components to which such designations apply, in relation to each other only, and in accordance with such designations, so that, as to those deliveries bearing lower designations, production or delivery may be deferred to the extent necessary to assure within the time specified those deliveries bearing higher designations within the same preference rating category.

(6) No producer shall duplicate, in whole or in part, purchase orders which he has placed with one or more suppliers in such manner that the amount of components ordered exceeds the amount of the producer's actual requirements of such components to support his authorized production of electronic equipment, even though he intends to cancel or reduce his purchase orders to the amount of actual requirements prior to completion of deliveries.

(c) *Special directions.*—The War Production Board may from time to time issue in respect to electronic equipment or components special orders or directions which:

(1) Alter or freeze production or delivery schedules in whole or in part;

(2) Direct any supplier to reschedule all or any portion of his production or delivery schedules of components to which precedence list designations are applicable as to each other only within any single preference rating category and in accordance with such precedence list designations;

(3) Direct the cancellation of any order held by any producer or supplier;

(4) Allocate any unfilled order from one to another producer or supplier;

(5) Direct the delivery of any electronic equipment or components in production or completed to any person at established prices and terms;

(6) Direct any person to establish a special stock of components for transfer or distribution for such purposes, under such conditions and in such amounts as the War Production Board may specify; or

(7) Take such other action as it deems necessary with respect to the placing of orders for, or the production or delivery of electronic equipment or components.

Any such special orders or directions shall be complied with notwithstanding War Production Board regulations or orders.

(d) *Applicability of regulations.* This order and all transactions affected thereby are subject to all applicable provisions of the regulations of the War Production Board, except to the extent that the provisions of paragraphs (b) and (c) provide for departure therefrom. No transactions pursuant to paragraphs (b) (5) or (c) (2) hereof shall interfere with any schedule specifically frozen by action of the War Production Board.

(e) *Violations.* Any person who wilfully violates any provision of this order or who in connection with this order wilfully conceals a material fact or furnishes false information to any department or agency of the United States is guilty of a crime, and upon conviction may be punished by fine or imprisonment. In addition any such person may be prohibited from making or obtaining further deliveries of or from processing or using material under priorities control and may be deprived of priorities assistance.

(f) *Appeals.* Any appeal from the provisions of this order shall be made by filing a letter in triplicate referring to the particular provision appealed from and stating fully the grounds of the appeal.

(g) *Communications.* All reports to be filed, appeals and other communications concerning this order should be addressed to War Production Board, Radio and Radar Division, Washington, D. C., Ref: L–183–a; except reports, appeals and other communications relating to wire communication equipment embraced within the definition of paragraphs (a) (2) (ii) and (a) (2) (iii) hereof which shall be addressed to War Production Board, Communications Division, Washington, D. C. Ref: L–183–a.

Issued this 10th day of May 1943.

WAR PRODUCTION BOARD,
By J. JOSEPH WHELAN,
Recording Secretary.

L-190

PART 3051—SCALES, BALANCES, AND WEIGHTS

[Limitation Order L–190, as Amended August 19, 1943]

The fulfillment of requirements for the defense of the United States has created a shortage in the materials used in the manufacture of scales, balances, and weights for defense, for private account and for export; and the following order is deemed necessary and appropriate in the public interest and to promote the national defense:

§ 3051.1 *Limitation Order L–190*—(a) *Definitions.* For the purpose of this order:

(1) "Person" means any individual, partnership, association, business trust, corporation, governmental corporation or agency, or any organized group of persons, whether incorporated or not.

(2) "Scales" means devices used for weighing persons, materials, objects or substances, or for grading, classifying, counting or evaluating materials, objects or substances in terms of weight, or the measuring of forces expressed in terms of weight. The term includes scales, balances, attachments, and weights.

(3) "Weights" means objects of established weight used in connection with the operation of scales and necessary to the operation or testing thereof.

(4) "Scales for household use" includes all scales commonly used for household purposes except dietetic scales graduated in the metric system for personal use by a person whose diet is regulated by a licensed physician and baby weighing or nursery scales.

(5) "New" scales are all scales other than those which have been used, or sold, rented or lent for the purpose of being used; except that scales which have been used solely for demonstration, trial loans or emergency repair loans are "new" scales.

(6) "Emergency repair loan" means the temporary leasing or lending of a

scale to replace a similar scale while the latter is being repaired.

(7) "Class One scales" means commercial scales for use in retail trade, spring type scales equipped with postal charts and having a retail list price of five dollars or less, and scales for household use, including bathroom scales and kitchen scales.

(8) "Class Two scales" means person weighing scales for clinical use and baby weighing or nursery scales.

(9) "Class Three scales" means mailing and parcel post scales, except spring type scales equipped with postal charts and having a retail list price of $5.00 or less.

(10) "Class Four scales" means all scales other than those in Class One, Class Two, Class Three, Class Five, or Class Six.

(11) "Class Five scales" means egg grading scales, milk scales, cotton beam scales, cotton spring scales, and grain sampling, grading, and testing scales.

(12) "Class Six scales" means dietetic scales, graduated in the metric system, for personal use by a person whose diet is regulated by a licensed physician.

(b) *Restrictions on production.* (1) No person shall fabricate parts for new Class One scales or assemble new Class One scales.

(2) During the twelve calendar months commencing April 1, 1943, and during any period of twelve calendar months commencing April 1 of any subsequent year, no person may fabricate or assemble a total number of new Class Two scales in excess of one-fourth of the total number of such scales billed by him to customers during the calendar year of 1941.

(3) During the twelve calendar months commencing April 1, 1943, and during any period of twelve calendar months commencing April 1 of any subsequent year, no person may fabricate or assemble a total number of new Class Three scales in excess of one-fourth of the total number of such scales billed by him to customers during the calendar year of 1941.

(4) No person engaged in the manufacture of scales shall increase his inventory of new scales in Class Four if that inventory following such increase will exceed one-twelfth of the total number of such scales billed by him to customers during the calendar year of 1941.

(5) During the twelve calendar months commencing April 1, 1943, and during any period of twelve calendar months commencing April 1 of any subsequent year, no person may fabricate or assemble a total number of new Class Five scales in excess of the total number of such scales billed by him to customers during the calendar year of 1941.

(6) During the twelve calendar months commencing April 1, 1943, and during any period of twelve calendar months commencing April 1 of any subsequent year, no person may fabricate or assemble a total number of new Class Six scales in excess of the total number of such scales billed by him to customers during the calendar year of 1941.

(c) *Restrictions on transfer.* (1) No person shall sell any new Class Three, Class Four or Class Five scales to fill any order for such scales in an amount of $50.00 or more, except orders to which the purchaser has applied or extended a preference rating issued on Form WPB–2581, Form PD–857, or to which the purchaser has applied or extended a rating of A–9 or higher prior to May 13, 1943. Any person placing such an order amounting to $50.00 or more after May 13, 1943, shall certify, in substantially the following form, that the preference rating applied or extended was issued on Form WPB–2581, Form PD–857.

The undersigned purchaser represents to the seller and to the War Production Board that the rating of ---------- applied or extended to this purchase order was issued on Form WPB–2581, Form PD–857.

The person receiving this certification shall be entitled to rely on such representation, unless he knows or has reason to believe it to be false.

(2) No person shall rent or lend any new Class Three, Class Four or Class Five scales to fill any order for such scales in any amount, except orders to which the person placing the order has applied or extended a rating issued on Form WPB–2581, Form PD–857, or to which the purchaser has applied or extended a rating of A–9 or higher prior to May 13, 1943. Any person placing such an order after May 13, 1943, shall certify that the rating was issued on Form WPB–2581, Form PD–857 in the manner provided in paragraph (c) (1) of this order, and the person receiving the certification shall be entitled to rely thereon unless he knows or has reason to believe it to be false.

(3) No person shall sell any new Class Three scales to fill any order for such scales in an amount over $5.00 and less than $50.00, except orders rated A–9 or higher.

(4) No person shall sell any new Class Four or Class Five scales to fill any order for such scales in an amount over $5.00 and less than $50.00, placed by a person intending to use such scales on a farm, except orders for which purchase certificates have been issued by a County Farm Rationing Committee, or orders to which a rating of A–9 or higher was applied or extended prior to May 13, 1943.

NOTE: Paragraph (5) amended; new paragraph (6) added; former paragraphs (6), (7) redesignated (7), (8) August 19, 1943.

(5) No person shall sell any new Class Four or Class Five scales to fill any order for such scales in an amount over $5.00 and less than $50.00, placed by a person intending to use such scales elsewhere than on a farm, except orders rated A–9 or higher.

(6) No person shall sell a new Class Four or Class Five scale having a retail list price of more than $5.00 to a person intending to resell it, except to fill orders rated A–9 or higher. Scales having a retail list price of $5.00 or less may be sold without ratings to persons buying them in amounts less than $50.00 for resale.

(7) No person shall sell any new Class Two or Class Six scales to any person acquiring such scales for personal or family use except to fill the prescription of a licensed physician.

(8) The restrictions of paragraphs (c) (1) to (c) (6), inclusive, of this order shall not apply to an emergency repl loan of new scales when no used sca are available for such use, or to the se ing, renting or lending of any sca which are sold or delivered as "labor tory equipment" in accordance with t provisions of Limitation Order L–144, amended.

(d) *Repair and maintenance* par (1) No person shall produce any repa or maintenance parts for scales f household use except parts to be us for rebuilding used commercial scal into baby weighing scales.

(2) During the twelve calend months commencing April 1, 1943, an during any period of twelve calend months commencing April 1 of any su sequent year, no person shall fabricat a quantity of parts for repair and mai tenance of scales which contains, wh finished, a total weight of metals great than 150% of the total weight of meta in the parts (exclusive of those for scal for household use) used or sold by hi for repair and maintenance of scal during the calendar year of 1941.

(e) *Restrictions on types, sizes an materials.* (1) So far as any other ord of the War Production Board may ha the effect of limiting or curtailing th use of any material in any scales or par thereof to an extent greater than here provided, the limitations of such orde shall be observed.

(2) No manufacturer shall assemb scales equipped with poises, weigh beam pans, scoops or commodity receivers copper or copper base alloys. This re striction does not apply to type bars, scales sensitive to a weight of one cent gram or less, or to racks, pinions an rollers for registering poises.

(3) After a period of sixty days follow ing October 10, 1942, no manufactur may fabricate weights of copper or cop per base alloys if such weights are d denominations of 20 grams (metric) o 1/2 ounce (avoirdupois) and over. Th restriction does not apply to weights d classes A, B, M, S, and S2 as defined an recognized by the National Bureau o Standards.

(4) The War Production Board ma from time to time issue schedule establishing simplified practices wit respect to the types, sizes, forms, mate rials and specifications or other qualifi cations for scales. After the effectiv date of any such schedule no scales sha be fabricated, or assembled, except suc as conforms to the issued schedule an except as specifically permitted by suc schedule.

(f) *Applicability of regulations.* Thi order and all transactions affected there by are subject to all applicable regula tions of the War Production Board, a amended from time to time, except tha notwithstanding the provisions of Pri orities Regulation No. 3, CMP Regu lation No. 5, or CMP Regulation No. 5A persons applying or extending a ratin issued on Form WPB–2581, Form PD–85 for scales shall certify that fact as re quired by paragraph (c) of this order, in addition to making any certifications re quired by said regulations.

(g) *Records.* All persons to whom thi order applies shall keep, and preserve fo not less than two years, accurate and complete records concerning inventories production and sales.

(n) *Audit and inspection.* All records ...uired to be kept by this order shall, ...n request, be submitted to audit and ...pection by duly authorized represent...es of the War Production Board.

(o) *Reports.* All persons affected by ...s order shall execute and file with the ...r Production Board such reports and ...swers to questionnaires as the War ...oduction Board shall from time to time ...quest.

(p) *Violations.* Any person who will...ly violates any provisions of this order, ... who, in connection with this order, ...lfully conceals a material fact or fur...shes false information to any depart...nt or agency of the United States is ...lty of a crime, and upon conviction, ...y be punished by fine or imprison...ment. In addition any such person may be prohibited from making or obtaining further deliveries of, or from processing or using, material under priority control and may be deprived of priorities assistance.

(k) *Appeals.* Any person affected by this order who considers that compliance therewith would work an exceptional and unreasonable hardship upon him, may appeal to the War Production Board setting forth the pertinent facts and the reasons such person considers that he is entitled to relief. The War Production Board may thereupon take such action as it deems appropriate.

(l) *Communications.* All reports to be filed hereunder, or communications concerning this order should be addressed to: War Production Board, Service Equipment Division, Service Machinery Section, Washington, D. C. Ref: L-190.

Issued this 19th day of August 1943.

WAR PRODUCTION BOARD,
By J. JOSEPH WHELAN,
Recording Secretary.

INTERPRETATION 1

Paragraph (a) (7) of § 3051.1, *Limitation Order L-190*, defines "Class One scales" to include "commercial scales for use in retail trade." The phrase "commercial scales for use in retail trade" means only cylinder-type scales, fan-type scales, hanging scales and even-balance scales of the kinds, sizes and models commonly used in making sales of merchandise direct to ultimate consumers.

Issued April 29, 1943.

L-203 Interpretation

EDITOR'S NOTE—L-203 (Electrical Indicating Instruments) and WPB Form 1682 were reproduced in our July issue. To save paper (they occupy five pages) we omit them here. Since then, the WPB has issued Interpretation 1 of an "approved order" [Par. (a) (4) (iv)] to mean "specified by the Army or Navy . . . The end use of the instruments must be for the account of the Army or Navy."

L-206

PART 3090—X-RAY EQUIPMENT

[General Limitation Order L-206 as Amended April 28, 1943]

The fulfillment of requirements for the defense of the United States has created a shortage in the supply for defense, for private account and for export of the materials entering into the manufacture of x-ray equipment; and the following order is deemed necessary and appropriate in the public interest and to promote the war effort:

§ 3090.1 *General Limitation Order L-206*—(a) *Definitions.* For the purposes of this order:

(1) "X-ray equipment" means the following radiographic equipment fluoroscopic equipment and therapy equipment (including industrial radiographic equipment and industrial fluoroscopic equipment): power units; radiographic, fluoroscopic, and therapy tables; photofluorographic units; cassette changers; and tube stands. The term shall not include (i) any parts, accessories, or appliances used in connection with radiography, fluoroscopy or therapy, other than the items specifically named above, (ii) rebuilt equipment, nor (iii) any equipment which has at any time been sold to an ultimate user.

(2) "Power unit" means a high-voltage transformer (with or without rectifying tubes) and control for x-ray use.

(3) "Radiographic, fluoroscopic or therapy table" means a table adapted for placing a patient in a position for radiography, fluoroscopy or therapy, and may be either stationary or tilting.

(4) "Photo-fluorographic unit" means an instrument for photographing the image cast by x-rays through a patient on a fluoroscopic screen. It includes a camera, supporting stand, and fluoroscopic screen. It is also known as a "photo-roentgen unit" or a "photofluorograph."

(5) "Cassette changer" means equipment designed to hold two cassettes (one protected from x-rays by a lead shield, and one in the radiographic field) which is constructed to interchange the position of the cassettes.

(6) "Tube stand" means a tubular or frame support (mounted on a base which is either mobile or stationary) which is designed to hold the carriage of an x-ray tube head and allow its vertical movement. The term shall not include supporting or mounting equipment designed for use in connection with industrial radiographic equipment and industrial fluoroscopic equipment.

(7) [Revoked April 28, 1943]

(8) [Revoked April 28, 1943]

(9) "Manufacturer" means any person engaged in the manufacturing, fabricating or assembling of x-ray equipment.

(10) "Put into production" means to begin the manufacture of x-ray equipment or to begin the assembly of fabricated parts which, when assembled, would constitute x-ray equipment.

(b) *Restrictions on the manufacture of x-ray equipment.* (1) No manufacturer shall manufacture, continue the manufacture of, or assemble any models or types of x-ray equipment other than the permitted number of models of the types set forth and described in Schedule A, attached hereto.

(2) In addition to the restrictions set forth in subparagraph (1) of this paragraph (b), during the period beginning April 28, 1943 and ending May 31, 1943, no person shall put into production any x-ray equipment (other than industrial radiographic equipment and industrial fluoroscopic equipment the manufacture of which has been specifically authorized in writing by the War Production Board), except to fill purchase orders or contracts of the Army or Navy of the United States, or any agency of the United States Government for delivery to or for the account of the government of any country pursuant to the Act of March 11, 1941, entitled, "An Act to Promote the Defense of the United States" (Lend-Lease Act). On and after June 1, 1943, no person shall put into production any x-ray equipment except pursuant to specific authorization by the War Production Board on Form PD-774. Each manufacturer shall file Form PD-774 in accordance with the provisions of paragraph (e) of this order.

(c) *Restrictions on the sale and delivery of x-ray equipment.* (1) Subject to the further restrictions contained in paragraph (e) of this order, no person shall sell, transfer or deliver any x-ray equipment except:

(i) To the Army or Navy of the United States, the United States Maritime Commission or the War Shipping Administration; or

(ii) To any agency of the United States Government for delivery to or for the account of the government of any country pursuant to the Act of March 11, 1941, entitled, "An Act to Promote the Defense of the United States" (Lend-Lease Act); or

(iii) To persons who have been specifically authorized by the War Production Board to receive x-ray equipment pursuant to application on Form PD-556, as provided in paragraph (d) of this order.

(2) No person shall receive or accept transfer or delivery of any x-ray equipment if he knows or has reason to believe that the transfer or delivery of such x-ray equipment is prohibited by the terms of paragraph (c) (1) of this order.

(d) *Procedure for obtaining authorization of the War Production Board on Form PD-556 and for filling such authorized orders.* (1) Each person seeking authorization, as permitted by paragraph (c) (1) (iii) of this order, to receive x-ray equipment shall prepare Form PD-556 (copies of which form may be

obtained at the local offices of the War Production Board) in the manner prescribed therein, subject to the following instructions:

(i) The form should be filed only by the person (transferee) desiring to receive x-ray equipment and not by the person (transferor) desiring to make delivery of such equipment.

(ii) Do not fill in column (b) and (c) of Table II.

(iii) Do not fill in sections 6, 7 and 8 of Table III.

(iv) Under section 5 of Table IiI give the following information:

(*a*) State whether or not you have in use any radiographic, fluoroscopic or therapy equipment. If so, (1) describe such equipment, (2) state the average number of patients per week on which such equipment is now used, and (3) state whether the equipment applied for would be used to replace existing equipment or is needed for expansion of existing facilities.

(*b*) State how you now accomplish the work for which the equipment applied for would be used.

(*c*) State what attempts you have made to obtain used or rebuilt equipment.

(*d*) Give any other pertinent information which bears on the question of your need for the equipment for which application is made.

(2) The authorization of the War Production Board on Form PD–556 shal apply not only to the purchase order by the original purchaser for the x-ray equipment specified on such form, but also to any orders for x-ray equipment placed by such purchaser's suppliers, as permitted below, in fulfillment of the authorized order. The original purchaser shall notify his supplier of the authorization by furnishing him with a certification in substantially the following form (on the purchase order or on an attached document):

> The undersigned hereby certifies that delivery of the x-ray equipment ordered by the within (or attached) purchase order has been authorized by the War Production Board on Form PD–556, Case No. ------, under the provisions of paragraph (d) of General Limitation Order L–206.
>
> Name----------
>
> By----------
>
> Authorized Official
>
> Date----------

The purchaser's supplier shall fill any such authorized order from his stock, if he has the authorized equipment in his stock; if he does not have the authorized equipment in stock, he may place an order with his supplier to obtain the authorized equipment, furnishing to his supplier (on or in connection with his purchase order) a certification in substantially the form set forth above.

Any such certification shall be signed by an authorized official, either manually or as provided in Priorities Regulation No. 7, and shall constitute a representation to the supplier and to the War Production Board of the facts certified therein. The supplier may rely upon such representation unless he knows or has reason to believe such representation to be false.

(e) *Production and shipping schedules and restrictions thereon.* On or before May 10, 1943, and on or before the 10th day of each succeeding calendar month, each manufacturer shall file with the War Production Board in triplicate on Form PD–774, his proposed production and shipping schedules of x-ray equipment for such period as production and shipping may be planned. Upon receipt of such form, the War Production Board will approve or disapprove the proposed production and shipping schedules or make such changes therein as it shall deem necessary, and will thereupon return to the manufacturer a copy of such form as approved or changed. Notwithstanding any preference rating which any order may bear or any rule or regulation of the War Production Board, each manufacturer shall produce and ship x-ray equipment in accordance with his production and shipping schedules as approved or changed by the War Production Board.

(f) [Revoked April 28, 1943]

(g) *Appeals.* Any person affected by this order who considers that compliance herewith would work an exceptional and unreasonable hardship upon him may appeal to the War Production Board (Ref: L–206) setting forth the pertinent facts and the reasons such person considers that he is entitled to relief. The War Production Board may thereupon take such action as it deems appropriate.

(h) *Applicability of regulations.* Except as otherwise provided herein, this order and all transactions affected thereby are subject to all applicable regulations of the War Production Board, as amended from time to time.

(i) *Violations.* Any person who wilfully violates any provision of this order or who, in connection with this order wilfully conceals a material fact or furnishes false information to any department or agency of the United States is guilty of a crime, and upon conviction may be punished by fine or imprisonment. In addition, any such person may be prohibited from making or obtaining further deliveries of, or from processing or using, material under priority control and may be deprived of priorities assistance.

(j) *Communications to War Production Board.* All communications concerning this order shall, unless otherwise directed, be addressed to: War Production Board Safety and Technical Equipment Division, Washington, D. C., Ref: L–206.

Issued this 28th day of April 1943.

WAR PRODUCTION BOARD,
By J. JOSEPH WHELAN,
Recording Secretary.

SCHEDULE A

NOTE: Items "Tube stand, radiograp with single column" and "Tube stand, therapy" were amended, and all items "S tionary grid" and "Bucky diaphragm" voked April 28, 1943.

Permitted number of models	Permitted types	Description of permitted types
1	Power unit	Not to exceed 100 milliamperes at 90 KVP, rectifying, with control.
1	Power unit	Not to exceed 200 milliamperes at 100 KVP, full wave rectification, of single tube design; either motor or stationary control, or both.
1	Power unit	½ Microfarad condenser discharge.
1	Power unit	Therapy unit, not to exceed 160 KVP.
1	Power unit	Therapy unit, not to exceed 250 KVP.
1	Dental x-ray unit.	Wall model, not to exceed milliamperes at 80 KVP.
1	Dental x-ray unit.	Floor model, not to exceed milliamperes at 80 KVP.
1	Vertical fluoroscope.	Power unit not to exceed milliamperes at 90 KVP.
1	Portable unit	Power unit not to exceed milliamperes at 80 KVP. A portable unit is one that is easily disassembled and transported. It may be equipped with or without casters, and with either collapsible or non-collapsible stand.
1	Mobile or bedside unit	Power unit not to exceed milliamperes at 90 KVP. It is specially designed for moving on its own casters.
1	Army field unit	Light duty, with a power unit not to exceed milliamperes, manufactured in accordance with the specifications of the Army of the United States.
1	Army field unit	Power unit not to exceed milliamperes, manufactured in accordance with the specifications of the Army of the United States.
1	Army tilting fluoroscopic unit.	Light weight table, consisting power unit not to exceed 15 milliamperes at KVP, manufactured in accordance with the specifications of the Army of the United States.
1	Army field table	Manufactured in accordance with the specifications of the Army of the United States.
1	Tilting table	Radiographic and fluoroscopic table, with or without mounting for fluoroscopic tube. The motor may be hand-operated (hand crank or rosette) or motor driven, or both.
1	Stationary table	Horizontal bucky table.
2	Tube stand	Radiographic, with single column.
1	Tube stand	Superficial therapy, with single column.
1	Tube stand	Deep therapy.
2	Cassette changer	Vertical or horizontal, with or without bucky diaphragm.
2	Photo-fluorographic unit.	

L-206 Interpretation

PART 3090—X-RAY EQUIPMENT

[Interpretation 1 of General Limitation Order L–206 as Amended]

In Schedule A attached to Order L-206 [§ 3090.1] permitted types of X-ray units are set forth and described. Maximum milliamperages are specified in the descriptions. When a maximum milliamperage is specified for a particular unit, it means that the unit must be one designed to operate at a milliamperage no higher than the figure specified. A unit designed to operate at a higher milliamperage than the specified maximum but

ich is brought down to the specified maxi-m by removing certain parts (such as ves) therefrom, will still be regarded as a t having the milliamperage at which it originally designed to operate.

This interpretation applies to any transtion taking place under Order L–206, inding authorizations on Form PD–556. For example, if a person is granted authority on Form PD–556 to receive a 100 milliampere power unit, his supplier may deliver only a unit designed to operate at a maximum milliamperage of 100 milliamperes and may not deliver a unit designed to operate at 200 milliamperes but which has been brought down to a maximum milliamperage of 100 milliamperes by removing the valves from it.

Issued this 29th day of July 1943.

WAR PRODUCTION BOARD,
By J. JOSEPH WHELAN,
Recording Secretary.

L-234

PART 3148—INDUSTRIAL TYPE INSTRUMENTS

[General Limitation Order L–234]

The fulfillment of requirements for the defense of the United States has created a shortage in the production of industrial type instruments for defense, for private account and for export; and the following order is deemed necessary and appropriate in the public interest and to promote the national defense:

§ 3148.1 *General Limitation Order L–234*—(a) *Definitions.* For the purposes of this order:

(1) "Person" means any individual, partnership, association, business trust, corporation, governmental corporation or agency, or any organized group of persons, whether incorporated or not.

(2) "Manufacturer" means any person to the extent that he is engaged in the production, fabrication or assembly of industrial type instruments, as defined below; and includes sales and distribution outlets controlled by such person.

(3) "Industrial type instrument" means any new mechanism of the kinds or types listed and defined on List A issued with this order as amended from time to time, whether or not to be used in an industrial process. The term shall not include (i) any combat measuring instruments as defined in Limitation Order L–203, or (ii) any instruments normally used on passenger automobiles and carriers, trucks, trailers, and off-the-highway motor vehicles, as defined in Limitation Order L–158.

(b) *Filing of monthly reports; production and delivery schedules may be prescribed.* (1) On or before the 10th day of January 1943, and the 10th day of each succeeding calendar month, every manufacturer shall file with the Director General for Operations a report on Form PD–750 containing the information required thereby, and shall also file such supplementary information as the Director General for Operations may from time to time require.

(2) Regardless of the terms of any other order or rule or regulation of the War Production Board, or of any contractual commitment by any manufacturer, purchaser or other person, the Director General for Operations may from time to time (i) prescribe production and delivery schedules for any manufacturer, for any industrial type instruments, and for any periods of time, (ii) direct the cancellation of any order held by any manufacturer, (iii) allocate any undelivered order to any other manufacturer, or (iv) direct the delivery of any industrial type instrument, whether in production or completed, to any other person, in accordance with prices and terms regularly established for sales by the supplying manufacturer to such a purchaser; and each manufacturer shall schedule and effect his production and make deliveries of industrial type instruments in accordance with any such direction of the Director General for Operations. No manufacturer shall alter any such schedule except upon specific direction from the Director General for Operations, but the point of delivery may be changed by the same purchaser without such authorization.

(3) In case of unavoidable delay, any manufacturer unable to maintain production and delivery in accordance with any such prescribed schedule shall immediately notify the War Production Board, by letter or telegram stating the reasons for such delay and the extent of the interruption of such schedule which has resulted and is expected to result therefrom. Any manufacturer may maintain a rate of production greater than anticipated in such schedule but shall give like notice of that fact. In either case the manufacturer shall continue to produce and deliver industrial type instruments in accordance with the sequence established by such schedule, unless and until otherwise directed by the Director General for Operations.

(c) *Miscellaneous provisions*—(1) *Applicability of priorities regulations.* This order and all transactions affected thereby are subject to all applicable provisions of the priorities regulations of the War Production Board, as issued and amended from time to time, except to the extent that any provision of this order may be inconsistent therewith, in which case the provision of this order shall govern.

(2) *Records.* All persons affected by this order shall keep and preserve for not less than two years accurate and complete records concerning inventories, purchases, production, and sales of industrial type instruments.

All records required to be kept by this order shall, upon request, be submitted to audit and inspection by duly authorized representatives of the War Production Board.

(3) *Reports.* All persons affected by this order shall execute and file with the War Production Board such reports and questionnaires as said Board shall from time to time request.

(4) *Violations.* Any person who wilfully violates any provision of this order, or who, in connection with this order, wilfully conceals a material fact or furnishes false information to any department or agency of the United States is guilty of a crime, and upon conviction may be punished by fine or imprisonment. In addition, any such person may be prohibited from making or obtaining further deliveries of, or from processing or using, materials under priority control, and may be deprived of priorities assistance.

(5) *Appeals.* Any appeal from the provisions of this order or any direction thereunder shall be made by filing a letter in triplicate, referring to the particular provision appealed from and stating fully the grounds of the appeal.

(6) *Communications.* All reports to be filed and other communications concerning this order should be addressed to: War Production Board, General Industrial Equipment Division, Washington, D. C., Ref.: L–234.

(P.D. Reg. 1, as amended, 6 F.R. 6680; W.P.B. Reg. 1, 7 F.R. 561; E.O. 9024, 7 F.R. 329; E.O. 9040, 7 F.R. 527; E.O. 9125, 7 F.R. 2719; sec. 2 (a), Pub. Law 671, 76th Cong., as amended by Pub. Laws 89 and 507, 77th Cong.)

Issued this 24th day of December 1942.

ERNEST KANZLER,
Director General for Operations.

LIST A

Millivoltmeter pyrometer: Any indicating, recording and or controlling type pyrometer, whether or not used as a resistance or radiation type instrument, but not including any portable type pyrometer.

Potentiometer pyrometer: Any indicating, recording and or controlling type potentiometer pyrometer, whether or not used as a resistance or radiation type instrument, but not including any portable type pyrometer.

Tube system temperature instrument: Any type indicating, recording and or controlling pressure-filled tube system temperature measuring instrument, whether or not used as a hygrometer, but not including any bimetallic type temperature measuring instrument.

Differential flow and liquid level instrument: Any type of indicating, recording, integrating and or controlling fluid manometer or bellows type flow and liquid level measuring instrument.

Liquid level float instrument: Any type indicating, recording and or controlling liquid level float type instrument having an external float chamber of the type used on industrial process applications.

Industrial thermometer: Any industrial thermometer having scale length commonly designated as 7", 9", 10" or 12", and any submarine type 5" scale length thermometer.

Pressure gauge: Any circular dial pressure or vacuum type instrument having a bourdon tube as pressure sensitive element.

Control valve: Any diaphragm operated pneumatic or hydraulic valve, but not including any gate valve, slide valve, or direct or integral pilot-operated valve which does not have a stuffing box, or any continuously connected hand wheel diaphragm operated control valve.

Continuously connected hand wheel diaphragm operated control valve.

Regulator: Any type self-operated valve used to control temperature, flow or liquid level; and any weight loaded type valve used to control pressure above 25 p. s. i. gauge or pressure where inlet pressure is above 25 p. s. i. gauge.

L-252

Part 3176—Valves and Valve Parts

[Limitation Order L-252, as Amended August 16, 1943]

The fulfillment of requirements for the defense of the United States has created a shortage of steel, copper, and other critical materials used in the manufacture of valves and valve parts, for defense, for private account, and for export; and the following order is deemed necessary and appropriate in the public interest and to promote the national defense:

§ 3176.1 *Limitation Order L-252*—(a) *Definitions.* Wherever used in this order:

(1) "Producer" means any person who manufactures valves and valve parts.

(2) "Valves" means gate, globe, angle, cross, lift check, angle check, or swing check valves (including variations of those types, such as the valves generally referred to as quick opening, blow off, hose end, Y-type and hydraulic), except drilling through and flow line valves for oil production service. This definition does not include valves of the types generally referred to as "specialties"

(3) "Valve parts" means parts for valves as defined above

(4) "Put into process" means to process, machine, or fabricate or in any other manner alter any material by physical or chemical means.

(b) *Limitations.* Except as specifically authorized by the War Production Board, no producer shall after May 1, 1943, put into process or cause to be put into process, any material to be incorporated into valves or valve parts, except for the manufacture of valves and valve parts which conform to the specifications contained in the Appendix attached to and a part of this order, or for the manufacture of:

(1) Valves

(i) The bodies or bonnets of which were cast or forged before May 1, 1943;

(ii) Ordered for use as part of the equipment of aircraft or watercraft other than pleasure craft; or

(iii) For the conduction of liquid or gas having chemical or physical properties which render the use of valves described in the Appendix dangerous or impractical; and

(2) Valve parts for repair of valves which are completed on May 1, 1943, or which are produced thereafter in accordance with the provisions of paragraph (b) (1) of this order.

(c) *Restricted deliveries.* Except as specifically authorized by the War Production Board:

(1) No producer shall sell or make delivery of any valves or valve parts manufactured in violation of the terms of this order, and

(2) No person shall knowingly purchase or accept delivery of any valve or valve part produced in violation of this order.

(d) *Order superseded.* The provisions of this order supersede the provisions of Schedule No. 1 of Limitation Order L-42.

(e) *Applicability of priorities regulations.* This order and all transactions affected thereby are subject to the provisions of all applicable priorities regulations.

(f) *Records.* Each producer shall retain in his files for a period of two years records showing his inventory and production of all valves, including those for the manufacture of which material was put into process subsequent to May 1, 1943. These records shall be kept readily available and open to inspection by duly authorized representatives of the War Production Board.

(g) *Appeals.* Any appeal from the provisions of this order shall be made by filing a letter in triplicate referring to the particular provision appealed from and stating fully the grounds of the appeal.

(h) *Violations.* Any person who wilfully violates any provision of this order or who, in connection with this order, wilfully conceals a material fact or furnishes false information to any department or agency of the United States, is guilty of a crime, and upon conviction, may be punished by fine or imprisonment or both. In addition any such person may be prohibited from making or obtaining further deliveries of, or from processing or using, material under priority control, and may be deprived of priorities assistance.

(i) *Communications.* All reports required to be filed hereunder and all communications concerning this order shall, unless otherwise directed, be addressed to: Shipbuilding Division, War Production Board, Washington, D. C., Ref.: L-252.

Issued this 16th day of August 1943.

War Production Board,
By J. Joseph Whelan,
Recording Secretary.

Appendix

Note: Part 2, paragraphs 2 (f), (g); part 3, paragraph 2 (b) amended August 16, 1943.

Specifications for Valves and Valve Parts

The following specifications govern the manufacture of valves and valve parts. These specifications do not purport to contain any recommendations regarding the most efficient or safe use of any valve or valve parts covered herein.

Certain of the terms used in this appendix (including the terms valves and valve parts) are defined in the body of this order, L-252. In addition, certain exceptions are made, and certain obligations imposed upon producers and others. You should, therefore, be thoroughly familiar with the body of the order before reading this appendix.

Part 1

Iron Gate, Globe, Angle, Cross, and Check Valves and Valve Parts

1. *Standard size schedule:* Iron valves (... Valves shall be manufactured only in the pressure classes listed in Table 1 and in particular sizes specified in Table 2 which are comprehended within the size range specified in Table 1 for the particular pressure class.

Note: Other valve end connections in common use on the date of issuance of this order, including among others, the types known as Victaulic, Dresser and Universal may be manufactured, but only in accordance with the specifications listed in Table 1. For the purposes of this order, "common use" means use by at least ten companies.

(b) Detail of permitted sizes (see 1 (a) above):

Table 2

(Sizes in inches)

¼	4	24
⅜	5	30
½	6	36
¾	8	42
1	10	48
1¼	12	54
1½	14	60
2	16	66
2½	18	72
3	20	

2. *General requirements for iron valves.* (a) End flanges shall conform to American Standards Association standards for corresponding pressure classes, except that for 150# and 300# valves when made of malleable iron as substitutes for brass valves flanges conforming to Manufacturers Standardization Society of the Valve and Fittings Industry Bronze Flange Standard SP-2 may be used. Flanges may be furnished to the American Gas Association flange standard for low pressure gas service.

(b) Face to face of flanged valves, size 4" and larger, shall comply with American Petroleum Institute standard #5-G-1 and American Standards Association standard B-16.10 for the pressure classes and types which these standards cover.

(c) Valves for 150# primary steam rating and lower shall have manufacturer's standard seating materials, comprising any of the following:

Non-metallic disc.
Iron or carbon steel.
Brass or bronze.
Nickel alloy.

(d) Valves for 250# primary steam rating and higher shall have manufacturer's standard seating materials, comprising any of the following:

Non-metallic disc.
Iron or carbon steel.
Brass or bronze.
Chrome iron.

Table 1

[All size ranges are inclusive]

Primary [1] pressure classifications in pounds per square inch		Gates (inches)			Globe and angle (inches)		Lift check (inches)		Swing check (inches)		
Steam	Water	Screwed	Flanged	Hub	Screwed	Flanged	Screwed	Flanged	Screwed	Flanged	Hub
25	50		4 to 72	4 to 72							
	100		4 to 72	4 to 72							
125	150 to 200	2 to 6	2 to 72	2 to 72	2 to 4	2 to 10	2 to 4	3 to 6	2 to 6	2 to 24	4 to 24
150 [1]	250	[2] ⅛ to 3	[2] 1 to 3		[2] ⅛ to 3	[2] 1 to 3	[2] ⅛ to 3		[2] ⅛ to 3		
250	300	2 to 4	2 to 24		2 to 4	2 to 6			2 to 4	2 to 12	
300 [1]		[2] ⅛ to 3	[2] 1 to 3		[2] ⅛ to 3	[2] 1 to 3			[2] ⅛ to 3		
	800	½ to 6	3 to 12							3 to 12	

[1] The primary pressure classification designates a class of valves and does not necessarily mean that all sizes in a given class carry the primary pressure classification. American Standards Association standards and manufacturers' practice frequently reduce the pressure ratings as size increases, and may not always rate valves for both steam and water.

[2] In sizes 3" and smaller the 150# and 300# primary pressure classification valves are included as substitutes for brass valves. Flanged valves may be rated in accordance with the American Flange Standard used.

Bonnet bolts or studs shall be carbon

Nuts for bonnet bolting shall be carsteel.

Handwheels shall be of ferrous metal, cast or otherwise fabricated, or of ble non-metallic material.

All extension stems, couplings and gear ings shall be of ferrous metal.

Spot facing or back facing on iron valve es is prohibited except when necessary prevent scrapping otherwise usable icts.

Iron gate valves. (a) Stems for outside and yoke valves shall be, at manufacs' option, either of carbon steel, or of or bronze made from secondary metal, copper base alloy to which refined copper fined tin is not added in the production e castings for the stems.

) Discs for solid wedge gates 4" and r and for split wedge or double disc 5" and larger, shall be all iron or iron faces conforming to paragraphs 2 (c) (d) depending upon pressure class. s for non-rising stem valves may be ded with brass or bronze bushing for thread.

) Bonnet bushing for backseating shall be provided in outside screw and yoke es.

d) Packing gland flange bolts or studs ll be carbon steel.

e) Nuts for packing gland flange bolts or s shall be carbon steel.

f) For valve 4" and larger, the packing d, if flange and follower or nose are one e, shall be of iron or iron brass bushed; made of two pieces, the flange shall be and the follower or nose may be brass

Iron globe, angle, and cross valves. (a) g" type discs shall not be used for pri- pressure 125# classification; but no ufacturer shall make more than one de- of metal to metal seat in this class.

(b) Discs for valves 4" and larger shall all iron or iron with faces conforming to agraphs 2 (c) or 2 (d) depending upon sure class.

(c) The hinge or arm for valves 2" and larger shall be of ferrous metal and may be bronzed bushed.

PART 2

Brass or bronze gate, globe, angle, cross, and check valves and valve parts

1. *Standard size schedule: Brass or bronze valves.* (a) Valves shall be manufactured only in the pressure classes listed in Table 1, and in the particular sizes specified in Table 2, which are comprehended within the size range specified in Table 1 for the particular pressure class:

TABLE 1

[All size ranges are inclusive]

Primary pressure classifications in lbs. per sq. in.[1]	Sizes[2] screwed end (inches)	Sizes flanged end (inches)	Sizes solder end (inches)
100 Steam	⅛ to 2		⅜ to 2
125 Steam	⅛ to 2		¼ to 2
150 Steam	⅛ to 2	1 to 2	¼ to 2
200 Steam	⅛ to 2	[3] 1 to 2	¼ to 2
300 Steam	¼ to 2	1 to 2	¼ to 2
Hydraulic 1000 & Higher	⅛ to 2		¼ to 1½

[1] The primary steam rating in no way regulates the pressure at which these valves should be rated for other fluids, but restricts the classes to those mentioned.

[2] Only globe and angle valves may be made in the ⅛" size.

[3] These valves are rated 150#.

(b) Detail of permitted sizes (see 1 (a) above):

TABLE 2

(Sizes in inches)

⅛	½	1¼
¼	¾	1½
⅜	1	2

2. *General requirements for brass or bronze valves.* (a) Check valves shall be horizontal lift and vertical lift or swing check types only. Angle type prohibited.

(i) End flanges shall conform to:

1. Manufacturers Standardization Society of the Valve and Fittings Industry, Standard Practice 150# SP-2.

2. Manufacturers Standardization Society of the Valve and Fittings Industry, Standard Practice 300# SP-2.

(Depending upon rated pressure of the valve.)

(j) Use Manufacturers Standardization Society of the Valve and Fittings Industry, SP-20 grade A or American Society for Testing Materials B-62 or EA-B62 brass or bronze for all valve pressure castings in valves in primary pressure classifications of 125#, 150# and 200# Use Manufacturers Standardization Society of the Valve and Fittings Industry, SP-20 grade B or American Society for Testing Materials B-61 brass or bronze for all valve pressure castings in valves in primary classifications of 300# or higher. Bonnets 200# and higher pressure classification may be made of a "cast bearing bronze."

(k) Cross valves shall not be manufactured

PART 3

Steel Gate, Globe, Angle, Cross, and Check Valves and Valve Parts

NOTE: These limitations do not apply for primary ratings higher than 1500#. Moreover, these limitations do not apply for valves for temperatures exceeding 1000 degrees F. or below minus 50 degrees F. Furthermore, these limitations do not apply to drilling through or flow line valves for oil production service.

The term "stainless" is used in this Part 3 of this appendix to describe any of the iron base alloys such as 12% chrome, or 18-8 chrome nickel whose primary characteristics are resistance to corrosive attack, or elevated temperature, or both.

1. *Standard size schedule: Steel valves.* (a) Valves shall be manufactured only in the pressure classes listed in Table 1, and in the particular sizes specified in Table 2 which are comprehended within the size range specified in Table 1 for the particular pressure class:

TABLE 1

[All size ranges are inclusive]

Primary pressure classification in lbs. per sq. in.	Gate (inches)			Globe and angle (inches)			Horizontal and angle check (inches)			Swing check (inches)		
	Screwed	Flanged	Welded	Screwed	Flanged	Welded	Screwed	Flanged	Welded	Screwed	Flanged	Welded
150	2 to 4	2 to 24		2 to 4	2 to 8					2 to 4	2 to 8	
200	2 to 4	2 to 24		2 to 4	2 to 12			2 to 8		2 to 4	2 to 12	
300	¼ to 2	½ to 24	¼ to 24	⅛ to 2	½ to 14	⅛ to 14	¼ to 2	½ to 14	¼ to 14	½ to 2	1¼ to 14	1¼ to 14
600		3 to 18	3 to 18		3 to 14	3 to 14		3 to 14	3 to 14		3 to 14	3 to 14
1000	¼ to 2	1½ to 14	¼ to 14	¼ to 2	1½ to 14	¼ to 14	¼ to 2	1½ to 14	¼ to 14		3 to 14	3 to 14

(c) Stems for outside screw and yoke valves shall be, at manufacturers' option, either of carbon steel, or of brass or bronze made from secondary metal, i. e., copper base alloy to which refined copper or refined tin is not added in the production of the castings for the stems.

(d) Bonnet bushing for back seating shall be provided.

(e) Packing gland flange bolts or studs shall be carbon steel.

(f) Nuts for packing gland flange bolts or studs shall be carbon steel.

(g) For valves 4" and larger, the packing gland, if flange and follower or nose are one piece, shall be of iron or iron brass bushed; if made of two pieces, the flange shall be iron and the follower or nose may be brass.

(h) Cross valves shall not be manufactured.

5. *Iron check valves.* (a) Discs for valves 4" and larger shall be either all iron, or iron or steel with faces conforming to paragraphs 2 (c) or 2 (d) depending upon pressure class.

(b) Nuts for attaching swing check disc to hinge or arm shall be carbon steel, or malleable iron.

(b) Spot facing on end connecting flanges is prohibited.

(c) 150# primary pressure classification and lower shall have integral seats.

(d) 150# primary pressure classification and lower shall have brass, bronze, or non-metallic disc only, and plug type discs shall not be used in globe and angle valves.

(e) 200# primary pressure classification and higher shall have manufacturer's standard seating materials comprising any of the following:

Non-metallic disc.
Brass or bronze.
Chrome iron.
Nickel alloy.

(f) Union bonnet rings and union rings for valve ends shall be brass, bronze, malleable iron or steel, at manufacturer's option.

(g) Stuffing box packing nuts shall be brass, bronze, malleable iron or steel, at manufacturer's option.

(h) Handwheels and valve handles shall be ferrous metal, either cast or otherwise fabricated; or suitable non-metallic material.

(b) Detail of permitted sizes.

TABLE 2

(Sizes in inches)

⅛	2	10
¼	2½	12
⅜	3	14
½	4	16
¾	5	18
1	6	20
1¼	8	24
1½		

2. *General requirements for steel valves.* (a) Valves covered by items 3, 4, and 5, which follow, shall be in accordance with American Petroleum Institute standard 600A for gate valves, and with American Standards Association B16e for all types, except as modified by the specifications set forth in this part 3 of this appendix.

(b) Face to face of flange end valves shall comply with American Petroleum Institute standard 5-G-1 and American Standards Association B16.10 for the types covered by these standards except as modified by the

specifications contained in paragraph 4 of part 3 of this appendix.

NOTE: Paragraph (2) (b) of appendix, part 3, amended August 16, 1943.

(c) Discs of valves 5" and larger shall be made of the same material as the valve body, with seating material laid on or attached.

(d) Handwheels 24" diameter and smaller shall be malleable iron, or fabricated steel.

(e) Raised contact faces on flanges shall be serrated (concentric or spiral) or smooth at manufacturer's option.

(f) Cross valves shall not be manufactured

3. *150 lb. Pressure class: Steel valves.* (a) End flange faces shall have American Standards Association 1/16" raised face

(b) Bodies and bonnets shall be carbon steel.

(c) Seating materials shall be any of the following:

Carbon steel.
Brass or bronze.
12% chrome iron

(d) Bonnet bushing for back seating shall not be provided, but backseating shall be included.

(e) Stems shall be carbon steel, brass or bronze.

(f) Bonnet bolting shall be either carbon steel or manganese steels of the SAE 1300 Series.

(g) Bonnet bolt nuts shall be semi-finished carbon steel

(h) Stem stuffing box packing shall be graphite or mica-impregnated asbestos according to manufacturer's practice.

(i) Bonnet gaskets shall be asbestos composition sheet.

4. *300 lb. Pressure class. Steel valves.* (a) End flange faces shall be American Standards Association 1/16" raised face, or American Petroleum Institute octagonal ring joint groove providing the groove is cut in the basic flange thickness.

(b) Bodies and bonnets shall be carbon steel, except when required to resist extreme corrosion or temperature conditions they may be 4% to 6% chrome, ½% molybdenum.

(c) The seating materials shall be any of the following:

Same material as body.
Brass or bronze.
12% chrome iron
Nickel copper alloy
Hard facing.

(d) Stems shall be any of the following:

Brass or bronze.
12% chrome iron.

(e) Stem stuffing box packing shall be graphite or mica-impregnated asbestos according to manufacturer's practice.

(f) Bonnet bolting shall conform to the following limitations:

1. For temperature up to and including 850 degrees F., National Emergency 9400 series steels or SAE 4140 steel.

2. For temperatures over 850 degrees F., Grade B14 steel per American Society for Testing Materials specification A193.

(g) Bonnet bolt nuts shall be semi-finished carbon steel.

5. *600 lb., 900 lb. & 1500 lb. Pressure classes. Steel valves.* (For 600 lb. and 1500 lb. general purpose valves, see paragraph 6) (a) End flange faces shall be either American Standards Association octagonal ring joint groove or American Petroleum Institute octagonal ring joint groove, or ¼" American Standards Association large male face.

(b) Bodies and bonnets shall be carbon or carbon molybdenum steel, except when required to resist extreme corrosion or temperature conditions in which case they may be 4% to 6% chrome, ½% molybdenum, or stainless if so specified. (See definition for "stainless" in note under heading of Part 3.)

(c) The seating materials shall be of any of the following:

Same material as body.
Stainless (See definition in note under heading of Part 3)
Nickel copper alloy.
Hard facing.

(d) Stems shall be the following:

Stainless (See definition in note under heading of Part 3)

(e) Stem stuffing box packing shall be graphite or mica-impregnated asbestos according to manufacturer's practice.

(f) Bonnet bolting shall conform to the following limitations:

1. For temperature up to and including 850 degrees F., National Emergency 9400 series steels or SAE 4140 steel.

2. For temperature over 850 degrees F., Grade B14 steel per American Society for Testing Materials specification A193.

(g) Bonnet bolt nuts shall be semi-finished carbon steel.

6. *General purpose steel valves, 600 lb. 1500 lb.—2" and smaller* (a) End connections shall be:

1. Flanged American Standards Association standard with ¼" large male face
2. Screwed end.
3. Socket welding end.

The 600 lb. class flanged end valves may be made with 150-lb. American Standards Association steel flange diameter, drilling and/or facing.

(b) Bodies and bonnets shall be carbon or carbon molybdenum steel, except when required to resist extreme corrosion or temperature conditions, in which case they may be 4% to 6% chrome, ½% molybdenum, or stainless if so specified. (See definition of "stainless" in note under heading of Part 3.)

(c) Seating materials shall be any of the following:

Same material as body.
Brass or bronze.
Stainless. (See definition in note under heading of Part 3.)
Nickel copper alloy.
Hard facing.

L-264

PART 3194—RECTIFIER TUBES

[General Limitation Order L-264 as Amended June 3, 1943]

The fulfillment of requirements for the defense of the United States has created a shortage in the supply of rectifier tubes and of materials used in the manufacture of such tubes for defense, for private account and for export; and the following order is deemed necessary and appropriate in the public interest and to promote the national defense:

§ 3194.1 *General Limitation Order L-264*—(a) *Definitions.* For the purposes of this order:

(1) "Rectifier tube" means any argon-filled, hermetically sealed bulb using a hot cathode, and designed to transform alternating into direct current, but limited to tungar, rectigon and similar types.

(2) "Manufacturer" means any person engaged in the business of producing or assembling any rectifier tube or part therefor.

(3) "Military exemption order" means a purchase order, contract or subcontract for rectifier tubes, or parts for such tubes (whether or not physically incorporated into rectifier tubes) to be purchased by or for the account of the Army or Navy of the United States, the United States Maritime Commission, the War Shipping Administration or the Armed Forces of any country eligible for Lend-Lease assistance pursuant to the Act of March 11, 1941, entitled "An Act to Promote the Defense of the United States" (Lend-Lease Act).

(b) *General restrictions.* (1) On and after March 10, 1943 no manufacturer shall produce any bases for rectifier tubes containing any metal except

(i) Iron and steel;

(ii) Copper, copper base alloys and zinc in protective coatings;

(iii) Copper or copper base alloys in fulfillment of military exemption orders;

(iv) Brass in eyelets or pins; or

(v) Pursuant to specific authorization of the War Production Board granted on Form PD-556 pursuant to an application filed on said Form.

(2) On or before the 15th day of June, 1943, and on or before the 15th day of each third succeeding calendar month thereafter, each manufacturer shall file with the War Production Board, Form PD-880 which shall include:

(i) Such manufacturer's proposed production schedules for rectifier tubes so far as then planned, but in any event for not less than the three calendar months following the filing of the report; and

(ii) His proposed delivery schedules of rectifier tubes so far as then planned but in any event for not less than the three calendar months following such filing. The War Production Board shall notify manufacturers of their approval or disapproval of the production and delivery schedules for the calendar quarter or more covered in the report. The War Production Board may, at any time change any schedules, direct the cancellation of any order shown on any schedule; prescribe any other schedule for production or deliveries for any period regardless of whether a schedule for such period, or any part thereof, has been reported by the manufacturer or theretofore approved by the War Production Board; allocate any order listed on the report to any other manufacturer or direct the delivery of any rectifier tubes so listed to any other person, at the established price and terms. No manufacturer shall produce or deliver any rectifier tubes except in accordance with schedules approved or prescribed by the War Production Board as above provided, and no manufacturer shall alter any such approved or prescribed production or delivery schedules unless authorized or directed to do so by the War Production Board.

(iii) If the schedule for production or deliveries approved under the provisions of this order do not correspond to the authorized production schedule approved for the same quarter under the Controlled Materials Plan (on Form CMP-4B, or any other designated form) then the schedule approved under this order shall constitute the authorized production schedule of the manufacturer.

(c) *Applicability of other orders.* So far as any other order heretofore or hereafter issued by the War Production Board limits the use of any material for the production of rectifier tubes to a greater extent than the limits imposed by this order, the restrictions in such

r order shall govern unless otherwise ified therein.

(d) *Applicability of regulations.* This r and all transactions affected there- are subject to all applicable provi- ns of the regulations of the War Pro- tion Board, as amended from time to .

(e) *Avoidance of excessive inventories.* manufacturer shall accumulate for in the manufacture of rectifier tubes parts therefor, including inventories raw materials, semi-processed mate- s or finished parts in quantities in ss of the minimum amount neces- to maintain production as permit- by this order.

(f) *Records.* All persons affected by order shall keep and preserve, for less than two years, accurate and plete records concerning inventories, uction and sales.

(g) *Audit and inspection.* All reports required to be kept by this order shall, upon request, be submitted to audit and inspection by duly authorized representatives of the War Production Board.

(h) *Reports.* All persons affected by this order shall execute and file with the War Production Board such reports and questionnaires as said Board shall from time to time require.

(i) *Appeal.* Any appeal from the provisions of this order shall be made by filing a letter in triplicate, referring to the particular provisions appealed from and stating fully the grounds of the appeal.

(j) *Violations.* Any person who wilfully violates any provision of this order, or who in connection with this order, wilfully conceals a material fact or furnishes false information to any department or agency of the United States, is guilty of a crime, and upon conviction may be punished by fine or imprisonment. In addition, any such person may be prohibited from making or obtaining further deliveries of, or from processing or using, material under priority control, and may be deprived of priorities assistance.

(k) *Communications.* All reports required to be filed hereunder, and all communications concerning this order shall, unless otherwise directed, be addressed to the War Production Board, Consumers Durable Goods Division, Washington, D. C., Ref: L-264.

Issued this 3rd day of June 1943.

WAR PRODUCTION BOARD,

By J. JOSEPH WHELAN,
Recording Secretary

L-265

PART 3037—ELECTRONIC EQUIPMENT

[General Limitation Order L-265 as Amended July 23, 1943]

The fulfillment of requirements for the defense of the United States has created a shortage in the supply for defense, for private account, and for export, of electronic equipment; and the following order is deemed necessary and appropriate in the public interest and to promote the national defense:

§ 3037.8 *General Limitation Order L-265*—(a) *Definitions.* For the purpose of this order:

(1) "Person" means any individual, partnership association, business trust, corporation, or any organized group of individuals whether incorporated or not.

(2) "Manufacture" means produce, fabricate or assemble electronic equipment, or perform any act or operation upon electronic equipment so as to modify or convert it from one to another type, use or mode of operation, but shall not include acts incidental to the maintenance or repair of electronic equipment.

(3) "Electronic equipment" means any electrical apparatus or device involving the use of vacuum or gaseous tubes and any associated or supplementary device, apparatus or component part therefor, and shall include any acoustic phonograph and component parts therefor. The term shall not include:

(i) Hearing aid devices;

(ii) Wire telephone and telegraph equipment;

(iii) Electric batteries;

(iv) Power and light equipment;

(v) Medical, therapeutic, x-ray and fluoroscopic equipment other than replacement electron tubes therefor;

(vi) Phonograph records and needles;

(vii) Automotive maintenance equipment as defined in Limitation Order L-270;

(viii) Incandescent, fluorescent and other electric discharge lamps, as defined in Limitation Order L-28; and rectifier tubes, as defined in Limitation Order L-264.

(4) "Preferred order" means any order for delivery to or for the account of the Army or Navy of the United States, the United States Maritime Commission, the War Shipping Administration, the Panama Canal, the Coast and Geodetic Survey, the Coast Guard, the Civil Aeronautics Administration, the National Advisory Committee for Aeronautics, the Office of Scientific Research and Development, Defense Supplies Corporation, Metals Reserve Company, any foreign country pursuant to the Act of March 11, 1941, entitled "An Act to Promote the Defense of the United States" (Lend-Lease Act), or any order bearing a preference rating of AA-4 or higher.

(5) "Transfer" means sell, lease, trade, give, deliver, or physically transfer in any way so as thereby to make available for the use of a person other than the transferor; but shall not include the transfer of electronic equipment by one person to another person for repair or storage thereof nor the return of such equipment to the owner thereof (or his agent).

(6) "Producer" means any person to the extent engaged in the manufacture of electronic equipment for transfer or for commercial use.

(7) "Supplier" means any person to the extent that his business consists in whole or in part of the sale, distribution or transfer from stock or inventory of electronic equipment, and includes wholesalers, distributors, jobbers, dealers, retailers, servicemen, branch warehouses or other distribution outlets controlled by producers and other persons performing a similar function.

(8) "Consumer" means any person who owns, operates or purchases electronic equipment for his own use.

(b) *Restrictions* (1) No producer shall manufacture any electronic equipment except:

(i) To fill preferred orders, or

(ii) To fulfill, under the Controlled Materials Plan, an authorized production schedule or authorized program, as defined in CMP Regulation 1.

(2) No producer or supplier (other than Defense Supplies Corporation) shall transfer any electronic equipment to any consumer, nor shall any consumer accept the transfer of any electronic equipment from any producer or supplier (other than Defense Supplies Corporation) except:

(i) To fill preferred orders, or

(ii) To fill orders bearing a preference rating of A-1-a or higher, or

(iii) To fill an order for any component part of electronic equipment provided the consumer delivers to the producer or supplier concurrently with the transfer a used, defective or exhausted part of similar kind and size which cannot be repaired or reconditioned; or, when circumstances render the delivery of a part for a part impractical, provided the consumer's purchase order (or written confirmation thereof) is accompanied by a certificate in substantially the following form signed by the consumer:

CONSUMER'S CERTIFICATE

I hereby certify that the part(s) specified on this order are essential for presently needed repair of electronic equipment which I own or operate.

Signature and Date

(3) No producer or supplier shall transfer any electronic equipment to any supplier, nor shall any supplier accept the transfer of any electronic equipment from any producer or supplier, except:

(i) To fill preferred orders, or,

(ii) To fill orders bearing a preference rating of A-1-a or higher or

(iii) To fill an order for component parts of electronic equipment required by the receiving supplier for the repair of electronic equipment then in his possession, or to replace in the inventory of the receiving supplier parts similar in kind and equal in number which have

been delivered on or after the 24th day of April 1943 by the receiving supplier to consumers against defective or exhausted parts or consumer's certificates, or to other suppliers against supplier's certificates, as specified in this order; provided the purchase order is accompanied by a certificate in substantially the following form signed by the receiving supplier:

SUPPLIER'S CERTIFICATE

I hereby certify that I am entitled to purchase the items specified on the accompanying purchase order under the provisions of Limitation Order L-265, with the terms of which I am familiar.

Signature and Date

The producer or supplier to whom the above certificate is furnished shall be entitled to rely thereon as evidence that the purchase order is within the provisions of this paragraph (b) (3) (iii), unless he has knowledge or reason to believe that it is false.

(4) No producer or supplier shall retain in his inventory, possession or control, for more than sixty (60) days, any used, defective, exhausted or condemned parts which cannot be reconditioned; but must dispose of them for salvage where practical, or destroy such parts as have no practical salvage value.

(5) After June 30, 1943, no person shall mark radio receiving type tubes with the symbol "MR" except when authorized or directed to do so by the War Production Board. No person shall use radio receiving type tubes which are marked "MR" in the manufacture of electronic equipment to fill any preferred order. No person shall transfer or accept the transfer of such tubes on any preferred order or any other order bearing a preference rating, except rated purchase orders for export. No producer shall transfer for export in any calendar quarter a quantity in excess of fifteen (15%) percent of his production of such tubes during that calendar quarter. Producers of such tubes may transfer them to each other without restriction.

(c) *Exceptions.* (1) The provisions of this order shall not apply:

(i) To the transfer of any finished product of the following kinds which was produced and designed for home use and the manufacture of which was completed on or before the 24th day of April 1943, to wit: radio receiving sets; phonographs and record players; sound motion picture projectors.

(ii) To transfers of electronic equipment which transfers are made on or before the 23d day of June 1943 pursuant to purchase orders placed prior to the 24th day of April 1943.

(iii) To the lease of electronic equipment to any person by any person: *Provided*, That the lessor was actually engaged in the leasing of such equipment as a normal incident and part of his established business prior to the 24th day of April 1943.

(iv) To the transfer of any finished product of the following kinds, the manufacture of which was completed on or before the 24th day of April 1943: automobile radio receiving sets designed for the reception of standard broadcasts; automatic phonographs as defined in Limitation Order L-21.

(v) To transfers of radio antennae; antenna couplers; power supplies and battery cables for battery type home radio receivers; automobile radio control assemblies, loudspeakers and cables; electric fence excitors; or musical instruments (other than phonographs and radios) which involve the use of vacuum gaseous tubes and the manufacture which was completed on or before 24th day of April 1943.

(2) The War Production Board from time to time specifically authorizes in writing exceptions to the provisions and restrictions of paragraphs (b) (3) and (b) (3) hereof.

(d) *Applicability of regulations.* This order and all transactions affected thereby are subject to all applicable provisions of the regulations of the War Production Board as amended from time to time.

(e) *Appeals.* Any appeal from provisions of this order shall be made by filing a letter in triplicate, referring to the particular provision appealed from and stating fully the grounds of the appeal.

(f) *Violations.* Any person who wilfully violates any provision of this order or who in connection with this order wilfully conceals a material fact or furnishes false information to any department or agency of the United States is guilty of a crime and upon conviction may be punished by fine or imprisonment. In addition any such person may be prohibited from making or obtaining further deliveries of, or from processing or using material under priority control and may be deprived of priorities assistance.

(g) *Communications.* All reports to be filed, appeals and other communications, concerning this order, should be addressed to War Production Board, Radio and Radar Division, Washington, D. C., Ref: L-265.

Issued this 23d day of July 1943.

WAR PRODUCTION BOARD,
By J. JOSEPH WHELAN,
Recording Secretary

L-270

PART 3203—MATERIAL ENTERING INTO THE PRODUCTION OF MAINTENANCE EQUIPMENT FOR PASSENGER AUTOMOBILES, LIGHT, MEDIUM AND HEAVY MOTOR TRUCKS, TRUCK TRACTORS, TRUCK TRAILERS, PASSENGER CARRIERS, AND OFF-THE-HIGHWAY MOTOR VEHICLES

[Limitation Order L-270 as Amended May 3, 1943]

The fulfillment of requirements for the defense of the United States has created a shortage in the supply of certain critical materials used in the manufacture of automotive maintenance equipment for defense, for private account and for export; and the following order is deemed necessary and appropriate in the public interest and to promote the national defense:

§ 3203.1 *Limitation Order L-270*—(a) *Applicability of regulations.* This order and all transactions affected thereby are subject to all applicable provisions of the regulations of the War Production Board, as amended from time to time.

(b) *Definitions.* For the purposes of this order:

(1) "Person" means any individual, partnership, association, business trust, corporation, governmental corporation or agency, or any organized group of persons, whether incorporated or not.

(2) "Producer" means any person engaged in the manufacture or assembly of any automotive maintenance equipment.

(3) "Automotive maintenance equipment" means the items listed on Schedules A, B, and C, to this order, as the same may be amended from time to time, which are manufactured or assembled for automotive repair usage.

(4) "Automotive repair usage" means repairing, reconditioning, rebuilding, renewing, servicing, or maintaining automotive vehicles or parts of automotive vehicles.

(5) "Automotive vehicles" means passenger automobiles, light, medium and heavy motor trucks, truck tractors, truck trailers, passenger carriers, and off-the-highway motor vehicles.

(6) "Original equipment" means any automotive maintenance equipment produced for or purchased by manufacturers of automotive vehicles for shipment with such vehicles and included in the manufacturer's sales price of the automotive vehicle.

(c) *Restrictions on production.* On and after April 30, 1943:

(1) No producer shall manufacture or assemble any automotive maintenance equipment listed in Schedule A.

(2) No producer shall manufacture or assemble in any calendar quarter any item of automotive maintenance equipment listed in Schedule B in excess of twenty (20) per cent of the number of like items of automotive maintenance equipment sold by him for other than original equipment in the corresponding calendar quarter of 1941.

(i) In the event that the limitation imposed by paragraph (c) (2) should result in restricting production, in any calendar quarter, to less than his minimum practical factory run of any item of automotive maintenance equipment listed in Schedule B, a producer may, notwithstanding the provision of paragraph (c) (2), produce a minimum practical factory run, provided that his dollar volume of sales of such item, in any calendar quarter shall not exceed twenty (20) per cent of the total dollar volume of sales of such item in the corresponding calendar quarter of 1941. But in no event may his production of such items during three consecutive calendar quarters exceed twenty (20) per cent of his production of such items during the three corresponding calendar quarters of 1941.

(3) No producer shall manufacture or assemble in any calendar quarter any item of automotive maintenance equipment listed in Schedule C in excess of seventy-five (75) per cent of the number of like items of automotive maintenance equipment sold by him for other than original equipment in the corresponding calendar quarter of 1941.

(c) No producer shall manufacture or assemble in any calendar quarter a dollar volume of repair or replacement parts for automotive maintenance equipment in excess of ten (10) per cent of the total dollar volume of automotive maintenance equipment sold by him in the corresponding calendar quarter of 1941.

(d) No producer shall use any aluminum, copper products, copper base alloy products, steel, or other critical materials in the manufacture of automotive maintenance equipment where the use of less critical material is practicable, and when so used such aluminum, copper products, copper base alloy products, steel, or other critical materials shall be reduced to the minimum quantity and grade necessary for the proper operation of the automotive maintenance equipment.

(e) [Revoked April 29, 1943]

(d) *Restriction on sales by producers.* No producer shall sell, transfer or deliver to any person any automotive maintenance equipment except pursuant to orders bearing a preference rating of A-5 or higher; *Provided*: That the provisions of this paragraph (d) shall not apply to repair parts for automotive maintenance equipment.

(e) *Exceptions to applicability of this order.* (1) The terms and restrictions of paragraphs (c) (1), (2), (3), and (4) of this order shall not apply to automotive maintenance equipment sold to or produced under contracts or orders for delivery to or for the account of the United States Army, Navy, Maritime Commission or the War Shipping Administration.

(2) The terms and restrictions of paragraphs (c) (2), (3) and (4) shall not apply to any automotive maintenance equipment sold to or produced under contracts or orders for delivery to or for the account of:

(i) The Panama Canal, the Coast and Geodetic Survey, the Coast Guard, the Civil Aeronautics Administration, the National Advisory Committee for Aeronautics, the Office of Scientific Research and Development;

(ii) The government of any of the following countries: Belgium, China, Czechoslovakia, Free France, Greece, Iceland, Netherlands, Norway, Poland, Russia, Turkey, United Kingdom, including its Dominions, Crown Colonies and Protectorates, and Yugoslavia;

(iii) Any agency of the United States Government, for delivery to, or for the account of, the government of any country listed above, or any other country, including those in the Western Hemisphere, pursuant to the act of March 11, 1941, entitled, "An Act to Promote the Defense of the United States," (Lend-Lease Act).

(f) *Records.* All persons affected by this order shall keep and preserve for not less than two years accurate and complete records concerning inventories, production and sales.

(g) *Reports.* All persons affected by this order shall execute and file with the War Production Board such reports and questionnaires as the Board shall from time to time request. No reports or questionnaires are to be filed by any person until forms therefor are prescribed by the War Production Board.

(h) *Violations.* Any person who wilfully violates any provision of this order, or who, in connection with this order, wilfully conceals a material fact, or furnishes false information to any department or agency of the United States, is guilty of a crime, and upon conviction may be punished by fine or imprisonment or both. In addition, any such person may be prohibited from making or obtaining further deliveries of, or from processing or using material under priority control and may be deprived of priorities assistance.

(i) *Audit and inspection.* All records required to be kept by this order shall, upon request, be submitted to audit and inspection by duly authorized representatives of the War Production Board.

(j) *Appeals.* Any appeal from the provisions of this order may be made by filing Form PD-500 in triplicate with the Automotive Division, War Production Board, stating therein the information called for.

(k) *Communications.* All communications concerning this order shall, unless otherwise directed, be addressed to: War Production Board, Automotive Division, Washington, D. C. Reference: Order L-270.

Issued this 3d day of May 1943.

WAR PRODUCTION BOARD,
By J. JOSEPH WHELAN,
Recording Secretary.

SCHEDULE A

Air towers.
Alignment machines (in excess of 500 pounds gross weight).
Analyzers, combustion.
Battery boosters.
Battery carrier straps (metal except post lugs).
Battery chargers, fast type.
Battery chargers, trickle type (except industrial installation).
Body and fender tools (hand, pneumatic, hydraulic, or electric operated).
Brake testing machines.
Car Washers.
Creepers (metal except casters).
Degreasing machines.
Distributor setting machines, synchrograph type.
Dynamometers, chassis.
Engine Cleaners (internal or external)
Frame Straightening Racks.
Frame straightening machines.
Front end combination inspection and/or Correction Machines (in excess of 500 pounds gross weight).
Gasoline mileage testers.
Headlight testers.
Jacks, service—portable type, mechanical or hydraulic (except three, five, eight, twelve, and twenty ton capacity).
Jacks, shop—wheel type, mechanical or hydraulic (except four and ten ton capacity).
Lifts—electric, hydraulic, pneumatic (excepting jacks)
Motor analyzers.
Motor repair stands (metal).
Scuff Detectors (in excess of 55 pounds metal content).
Tire air pressure gauges (except pencil type and truck service type).
Tire pumps, hand operated (except with 1½" x 20" barrel, flat base and two ply hose).
Wheel balancers.
Wheel dollies (metal).

SCHEDULE B

NOTE: Items "Battery testing clips," "Fuel pump testers," "Master air gauges," and "Tire valve service tools" were added, and "Battery chargers . . ." amended May 3, 1943.

Alignment machines (metal content, 500 pounds or less)
Air chucks
Axle bending bars
Battery cell testers (prong type)
Battery chargers (wall type, six battery or over capacity)
Battery charging clips
Battery fillers
Battery jumpers
Battery testing clips
Brake fillers
Brake lining appliers
Brake riveters
Brake shoe gauges
Cam angle meters
Camber gauges
Caster gauges
Circuit testers
Cleaners, steam or vapor
Coil testers
Condenser testers
Front axle straighteners (metal content, 450 pounds or less)
Front end combination inspection and/or correction machines (metal content, 500 pounds or less)
Fuel pump testers
Horses or trestles (metal)
Hydraulic rams
Jacks, push-pull (hydraulic or mechanical)
Jacks, shop-wheel type, hydraulic or mechanical (four and ten ton capacity)
Master air gauges
Piston expanders
Piston ring compressors
Ring groove cleaning tools
Scuff detectors (metal content, 55 pounds or less)
Spark plug gauges
Spark plug cleaners
Spark plug tire pumps
Spark plug tire pump adapters
Tire pumps, foot operated
Tire pumps, hand operated (1½" x 20" barrel, flat base and two ply hose)
Tire pumps, automobile engine operated
Tire valve service tools
Toe-in gauges
Turning radius plates
Wrecking cranes
Wheel straighteners

SCHEDULE C

NOTE: Item "Valve seat grinders" was added May 3, 1943.

Air pressure gauges (Pencil type and truck service type)
Align reamers
Anti-freeze testers
Battery hydrometers
Brake drum gauges
Brake drum grinders
Brake drum lathes
Clutch rebuilders
Compression gauges
Connecting rod aligners
Connecting rod grinders
Connecting rod reamers
Crankshaft grinders
Cylinder boring bars
Cylinder grinders
Cylinder hones
Cylinder ridge reamers
Jacks, service—Portable type, hydraulic or mechanical (three, five, eight, twelve and twenty ton capacity)
Main bearing boring equipment
Piston grinders
Piston pin grinders
Piston pin hones
Piston pin reamers
Pressure plate grinders
Ring gear riveters
Timing lights
Tire air pressure gauges (Pencil type and truck service type)
Transmission jacks
Vacuum gauges
Valve grinders
Valve guide reamers
Valve refacers
Valve seat grinders
Valve seat insert tools
Valve seat insert grinders
Valve seat reamers

L-272

Part 3207—Industrial Type Instruments, Control Valves and Regulators: Simplification

[Limitation Order L-272]

The fulfillment of requirements for the defense of the United States has created a shortage in the supply for defense, for private account and for export of industrial type instruments, control valves, and regulators, and of critical materials entering into the production thereof, and the following order and the schedules issued pursuant hereto are deemed necessary and appropriate in the public interest and to promote the national defense:

§ 3207.1 *Limitation Order L-272*—(a) *Definitions.* For the purpose of this order and any schedule issued pursuant hereto:

(1) "Producer" means any person who manufactures for sale control valves, regulators or any industrial type instrument as said products may be determined and defined in any schedule issued pursuant to this order.

(2) "Manufacture" means to put into production by performing or causing the performance of the first operation of machining, altering, processing or assembling material, by physical or chemical means, for the fabrication, assembly or production of control valves, regulators, or any industrial type instrument.

(3) "Repair part" means any component part of any control valve, regulator or industrial type instrument, as said products may be determined and defined in any schedule issued pursuant to this order, which is designed and produced to replace an identical part when such replacement is essential to the repair of any control valve, regulator or industrial type instrument.

(b) *Limitations.* (1) The Director General for Operations may from time to time issue schedules to this order establishing simplified practices with respect to the types, sizes, forms, specifications, composition, or other qualifications for control valves, regulators, and industrial type instruments; and on and after the date of issuance of any such schedule no producer shall manufacture any control valve, regulator or industrial type instrument to which such schedule relates which does not conform to the types, sizes and other specifications contained and prescribed in such schedule.

(2) No person shall sell or make delivery, and no person shall knowingly purchase or accept delivery of any control valve, regulator or industrial type instrument manufactured in violation of the terms of this order or any schedule issued pursuant hereto.

(c) *Exemptions.* (1) The provisions of this order and any schedule issued pursuant hereto shall not apply to the manufacture, sale, purchase or delivery of:

(i) Any control valve, regulator or industrial type instrument manufactured to fill a purchase order placed prior to the date of issuance of any applicable schedule, except to the extent specified in such schedule, or

(ii) Any repair parts.

(2) Where the provisions of this order or any schedule issued pursuant hereto conflict or are inconsistent with the provisions of Limitation Order L-134, the less restrictive provisions of either shall control to the extent of such conflict or inconsistency.

(d) *Applicability of regulations.* This order and any schedule issued pursuant hereto are subject to all applicable provisions of the regulations of the War Production Board.

(e) *Records.* All persons affected by this order or any schedule issued pursuant hereto shall keep and preserve for not less than two (2) years accurate and complete records concerning the manufacture, sale and delivery of control valves, regulators and industrial type instruments.

(f) *Reports.* All persons affected by this order or any schedule issued pursuant hereto shall file such reports as may be required from time to time by the War Production Board.

(g) *Appeals.* Any appeal from the provisions of this order or any schedule issued pursuant hereto shall be made by filing a letter in triplicate referring to the particular provision appealed from and stating fully the grounds of the appeal.

(h) *Violations.* Any person who wilfully violates any provision of this order or any schedule issued pursuant hereto, or who in connection with this order or any such schedule, wilfully conceals a material fact or furnishes false information to any department or agency of the United States is guilty of a crime, and upon conviction may be punished by fine or imprisonment. In addition, any such person may be prohibited from making or obtaining further deliveries of, or from processing or using material under priority control, and may be deprived of priorities assistance.

(i) *Communications.* All reports required to be filed hereunder, appeals and other communications concerning this order, or any schedule issued pursuant hereto, should be addressed to: War Production Board, Radio and Radar Division, Washington, D. C., Ref.: L-272.

Issued this 22d day of February 1943.

Curtis E. Calder,
Director General for Operations.

Part 3207—Industrial Type Instruments, Control Valves and Regulators: Simplification

[Schedule I to Limitation Order L-272]

CONTROL VALVES

§ 3207.2 *Schedule I to Limitation Order L-272*—(a) *Definition.* "Control valve" means any globe type valve, the inner portion of which is automatically positioned by pneumatic or hydraulic motive power, and which is produced and designed for use with any industrial type instrument, and shall include any body assembly thereof irrespective of the use to which such body assembly may be applied; exclusive, however, of control valves manufactured for use on watercraft other than pleasure craft.

(b) *Specifications.* (1) Screwed, union and flanged ends for bronze, iron and steel body control valves shall be manufactured only as follows:

(a) Screwed ends up to and including 2-inch sizes for primary pressure rating of 600-lb. American Standards Association and lower.

(b) Flanged ends, 2-inch size and above.

(c) Union ends shall be eliminated.

(2) Flanged body control valves shall be manufactured only with flanged ends and for primary pressure ratings as follows:

(a) Cast steel control valve bodies:

300-lb. American Standards Association.
600-lb. American Standards Association.
900-lb. American Standards Association.
1500-lb. American Standards Association.

End flange faces shall be either American Standards Association large male face; American Standards Association octagonal ring joint groove; or American Petroleum Institute octagonal ring joint groove, providing the groove is cut in the basic flange thickness in the 300-lb. pressure class.

(b) Cast iron control valve bodies:

125-lb. American Standards Association.
250-lb. American Standards Association.

(c) Bronze control valve bodies:

150-lb. Manufacturers Standardization Society—SP2.
300-lb. Manufacturers Standardization Society—SP2.

(3) Reduced area trim in balanced type control valves shall be furnished only where safety considerations require such construction.

(4) The following sizes of control valves shall be eliminated:

3½ inch—4½ inch—5 inch—7 inch.

(5) Materials for control valve bodies shall be limited to bronze, cast iron, cast carbon steel or forged carbon steel; except that carbon molybdenum steel may be used in the 600-lb., 900-lb. and 1500-lb. American Standards Association primary pressure classes, or for operating temperatures exceeding 1000 degrees Fahrenheit or below minus 50 degrees Fahrenheit.[1]

(6) Producer's standard forms of the following classes shall be manufactured only:

Parabolic.
V-port.
Quick-opening.

(This limitation does not restrict the manufacture of butterfly, angle or needle type valves).

(7) Inner valves and seat rings for control valves shall be manufactured from the following materials only:

(a) Carbon steel.

(b) Stainless steel of chromium content not to exceed eighteen percent and nickel content not to exceed eight percent.[1]

(c) Bronze or brass.

Issued this 22d day of February 1943.

Curtis E. Calder,
Director General for Operations.

[1] See paragraph (c) (2) of Limitation Order L-272.

Part 3207—Industrial Type Instruments, Control Valves and Regulators; Simplification

[Schedule II to Limitation Order L-272]

LIQUID LEVEL CONTROLLERS

§ 3207.3 *Schedule II to Limitation Order L-272*—(a) *Definition.* "Liquid level controller" means any float cage, external ball float or displacement type instrument normally used for the con-

of liquid level in industrial type processes; exclusive, however, of liquid level controllers, manufactured for use on watercraft other than pleasure craft.

(b) *Specifications.* Liquid level controllers shall be furnished only with 1 inch, 1½ inch or 2 inch National Pipe Thread screwed equalizing connections at producer's option for each size produced.

Issued this 22d day of February 1943.

CURTIS E. CALDER,
Director General for Operations.

PART 3207—INDUSTRIAL TYPE INSTRUMENTS, CONTROL VALVES AND REGULATORS; SIMPLIFICATION

[Schedule III to Limitation Order L-272]

PYROMETERS AND RESISTANCE THERMOMETERS

§ 3207.4 *Schedule III to Limitation Order L-272*—(a) *Definitions.* (1) "Pyrometer" includes millivoltmeter and potentiometer pyrometers and means any galvanometer type or null current automatically balanced type of potential measuring instrument which measures thermocouple voltage, is calibrated in degrees temperature, and has a scale length of not less than 4½ inches; exclusive, however, of precision type pyrometers manufactured and designed for laboratory use, or for use on watercraft other than pleasure craft.

(2) "Resistance thermometer" means any galvanometer type or null current automatically balanced type resistance measuring instrument which measures variations in resistance, is calibrated in degrees temperature and has a scale length of not less than 4½ inches; exclusive, however, of precision type resistance thermometers manufactured and designed for laboratory use, or for use on watercraft other than pleasure craft.

(b) *Operation of Schedule III.* The exemption provisions of paragraph (c) (1) (i) of Limitation Order L-272 shall not apply to this schedule.

(c) *Specifications.* (1) The following features, attachments and devices shall be eliminated:

(i) Special scale designs.

(ii) Special size cases and special finishes.

(iii) Cases having special design external wiring or conduit connection, either as to type or location of connections.

(iv) Internally mounted, manually operated thermocouple selector switches.

(v) External protection cases.

(vi) Special attachments or housing to adapt to explosion resistant service.

(vii) Special nameplates.

(viii) Legend plates.

(ix) Locks on control setters.

(x) Handles on non-portable instruments.

(xi) Connecting lugs with thermocouple leads for pyrometers having an internal resistance of one hundred ohms and above.

(2) Only one size chart for each style or type (strip or round) shall be furnished, size to be at producer's option.

(3) No scale or chart illumination (external or internal) shall be furnished except where same is a part of producer's standard manufacturing practice.

(4) No instrument lock and keys shall be furnished except where same are a part of producer's standard manufacturing design and practice.

Issued this 22d day of February 1943.

CURTIS E. CALDER,
Director General for Operations.

PART 3207—INDUSTRIAL TYPE INSTRUMENTS, CONTROL VALVES AND REGULATORS; SIMPLIFICATION

[Schedule IV to Limitation Order L-272]

INDICATING DIAL PRESSURE GAUGES

§ 3207.5 *Schedule IV to Limitation Order L-272*—(a) *Definition.* "Gauge" means any instrument which measures and indicates any pressure or vacuum (regardless of the units specified on the dial) by means of a bourdon spring or springs, a diaphragm or a bellows; or any complete element assembly of such instrument without a case; exclusive, however, of airborne gauges and any pressure regulator which consists of an enclosure containing a bourdon tube and a relay used for the control of an electric motor starter.

(b) *Specifications.* (1) Gauges, other than airborne gauges, shall be manufactured only in the following sizes (expressed in inches-dial diameter): 1½, 2, 2½, 3½, 4½, 6, 8½, 12: *Provided, however,* That there may be manufactured:

(i) Inspector's test gauges in the 3-inch size.

(ii) Submarine depth gauges and testing machine gauges in the 16-inch size.

(iii) Railroad gauges in 5-inch and 6¾ inch sizes.

(iv) Special gauges for specific Navy applications the manufacture of which may be authorized in writing by the War Production Board.

(2) Gauges shall be manufactured only in the following pressure ranges: 0–30 in. Vac.; 30 in.-15 lb.; 30 in.-30 lb.; 30 in.-60 lb.; 30 in-100 lb.; 30 in.-150 lb.; 30 in.-300 lb.; 0–15 lb.; 0–30 lb.; 0–60 lb.; 0–100 lb.; 0–160 lb.; 0–200 lb.; 0–300 lb.; 0–400 lb.; 0–600 lb.; 0–800 lb.; 0–1,000 lb.; 0–1,500 lb.; 0–2,000 lb.; 0–3,000 lb.; 0–5,000 lb.; and 0–10,000 lb.: *Provided, however,* That there shall be no limitations on ranges for pressures lower than 15 lb., or higher than 10,000 lb. p. s. i.: *And provided, further,* That a pressure range of 80 lb. p. s. i. shall be permitted for oil pressure gauges used on automotive equipment.

(3) Altitude and metric graduations shall be limited to the equivalents of the ranges specified in subparagraph (b) (2) hereof.

(4) The following items, features and devices shall be eliminated in the manufacture of gauges:

(i) Retard and suppressed scale gauges, except where required by Army or Navy specifications.

(ii) Brass cases, except where required by Army or Navy specifications.

(iii) Polished rings, except where required by Army or Navy specifications.

(iv) Plated rings.

(v) Inside case illumination, except for railroad gauges.

(vi) Electric contacts.

(vii) Outside adjustable maximum pointers, or other outside operable pointers, except for testing machine gauges or where required by Army or Navy specifications.

(viii) Customer's name on dial.

(ix) Installation of clocks in gauge cases.

(x) Duplex gauges, except in 4½-inch dial size and in railroad gauges.

(5) Gauges in sizes 4½-inch dial diameter, or larger, shall be manufactured with the following connections only, except where otherwise required by Navy or Maritime Commission specifications:

(i) ¼-inch pipe thread up to but not including 1,000-lb. p.s.i. total dial graduation;

(ii) ½-inch pipe thread, from 1,000-lb. to 10,000-lb. p.s.i. dial graduation, inclusive.

Issued this 29th day of May 1943.

WAR PRODUCTION BOARD,
By J. JOSEPH WHELAN,
Recording Secretary.

PART 3207—INDUSTRIAL TYPE INSTRUMENTS, CONTROL VALVES AND REGULATORS: SIMPLIFICATION

[Schedule V to Limitation Order L-272]

REGULATORS

§ 3207.6 *Schedule V to Limitation Order L-272*—(a) *Definitions.* "Regulator" means any of the following types of self-operated valves used to control temperature or pressure (exclusive, however, of body assemblies subject to the provisions of Schedule I to Limitation Order L-272):

(1) Self-operated temperature regulators.

(2) Self-contained pilot-operated pressure regulators.

Provided, however, That all sizes for 150-lb. American Standards Association primary pressure rating may be manufactured where required by Navy, Maritime Commission, or War Shipping Administration specifications.

End flange faces shall be either American Standards Association large male face; American Standards Association octagonal ring joint groove; American Petroleum Institute octagonal ring joint groove, provided the groove is cut in the basic flange thickness in the 300-lb. pressure class; American Standards Association large tongue and groove for regulators manufactured for the control of a liquid or gas having chemical or physical properties which would render dangerous the use of regulators otherwise constructed; or otherwise as required by Navy specifications.

(ii) Cast iron body regulators:

(*a*) Screwed ends in sizes up to and including 2-inch.

(*b*) Flanged ends in sizes 2-inch and above.

(*c*) Flanged body regulators shall be manufactured only with flange facings and for primary pressure ratings as follows:

125-lb. American Standards Association.
250-lb. American Standards Association.

American Standards Association large tongue and groove construction shall be permissible for regulators manufactured for the control of a liquid or gas having chemical or physical properties which would render dangerous the use of regulators otherwise constructed.

(iii) Bronze body regulators:

(*a*) Screwed ends, or union ends (sub-

ject to the provisions of Conservation Order M–9–c) up to and including 2-inch.

(3) All other pressure regulators (including, but not limited to, reducing valves, back pressure valves, pump governors, and altitude valves).

(b) *Specifications.* (1) Screwed and flanged ends for steel, iron and bronze body regulators shall be manufactured only as follows:

(i) Steel body regulators:

(*a*) Screwed ends up to and including 2-inch size for primary pressure ratings of 600-lb. and 1,500-lb. American Standards Association.

(*b*) Flanged body regulators shall be manufactured only in the following sizes and for primary pressure ratings as follows:

Primary pressure ratings:	*Sizes*
300-lb. American Standards Association	2-inch and above
600-lb. American Standards Association	½-inch and above
900-lb. American Standards Association	3-inch and above
1500-lb. American Standards Association	1-inch and above

(*b*) Flanged ends in sizes up to and including 2-inch where required by Navy specifications.

(*c*) Flanged regulators in sizes 2-inch and above are not to be made in bronze, except when corrosion or safety factors necessitate use of this metal, or as permitted under Conservation Order M–9–c.

(*d*) Flanged body regulators shall be manufactured only with flange facings and for primary pressure ratings as follows:

150-lb. Manufacturers Standardization Society—SP2, or as required by Navy specifications.

300-lb. Manufacturers Standardization Society—SP2, or as required by Navy specifications.

(2) Reduced area trim in balanced type regulators shall be furnished only where safety considerations require such construction.

(3) The following sizes of regulators shall be eliminated:

(i) 3½-inch, except where required by Navy, Maritime Commission or War Shipping Administration specifications.

(ii) 4½-inch, except where required by Navy specifications.

(iii) 7-inch.

(iv) 9-inch.

(4) Materials for regulator bodies shall be limited to bronze, cast or malleable iron, cast or forged carbon steel; except that carbon molybdenum steel may be used in the 600-lb., 900-lb. and 1,500-lb. American Standards Association primary pressure classes, or for operating temperatures exceeding 1,000 degrees, Fahrenheit, or below minus 50 degrees Fahrenheit.[1]

(5) Inner valves and seat rings for regulators shall be manufactured from the following materials only:

(i) Carbon steel.

(ii) Alloy steel of chromium content not to exceed 18 percent and nickel content not to exceed 8 percent.

(iii) Bronze or brass.

(iv) Non-metal composition materials.

(v) Monel metal where required by Navy specifications.

(6) Bolting material shall conform to the following specifications, except as otherwise required by Navy specifications:

(i) Steel body regulators:

150-lb. pressure class—bolting shall be either carbon steel or manganese steel of the SAE 1300 series.

300-lb., 600-lb., 900-lb. and 1,500-lb. pressure class—bolting shall conform to the following limitations:

(*a*) For temperatures up to and including 850 degrees Fahrenheit National Emergency 9400 series steels or SAE 4340 steel.

(*b*) For temperatures over 850 degrees Fahrenheit grade B–14 steel per American Society for Testing Materials Specification A–193.

(ii) Cast iron body regulators:

Bolting shall be carbon steel.

(7) Expanded outlet flanges shall be eliminated, except for primary pressure ratings of 400-lb. and above, or where required by Navy specifications.

Issued this 29th day of May 1943.

WAR PRODUCTION BOARD,
By J. JOSEPH WHELAN,
Recording Secretary.

[1] See paragraph (c) (2) of Limitation Order L–272.

L-272 Interpretation

PART 3207—INDUSTRIAL TYPE INSTRUMENTS, CONTROL VALVES AND REGULATORS: SIMPLIFICATION

[Interpretation 1 of Limitation Order L–272 and Schedules Thereto]

The following interpretation is hereby issued with respect to Limitation Order L–272 and schedules thereto:

At several points in the simplification schedules to Limitation Order L–272 the manufacture of instruments of certain types, or special items, features or devices on instruments, is permitted only where required by Army, Navy, Maritime Commission or War Shipping Administration specifications, as indicated in each instance. For example, Schedule IV, paragraph (b) (4) (ii), requires the elimination of brass cases for gauges, "except where required by Army or Navy specifications". Again, Schedule V, paragraph (b) (3) (i), eliminates the 3½-inch size regulator, "except where required by Navy, Maritime Commission, or War Shipping Administration specifications."

Wherever such a provision appears in the order, or schedules thereto, it means that for the exception to be operative the specification must be required by the named service branch or Federal Agency. To illustrate, a gauge with brass case may be furnished for delivery on a direct Navy procurement, or for delivery on a purchase order for gauges which are ultimately for the account of the Navy (e. g., to be installed as a component in an end product being manufactured under a prime contract of the Navy), provided in either instance that the Navy, in its direct procurement or its prime contract, requires gauges conforming to Navy specifications which prescribe a brass case. The end use of the gauge, or other instrument, must be for the account of the service branch or agency whose required specifications are excepted.

Such an exception does not mean, therefore, that a manufacturer may produce the prohibited instruments or items simply by manufacturing them in conformity with the service or agency specifications mentioned and thereafter deliver them against such orders. Nor does it mean that any customer may procure such prohibited instruments or items by prescribing the permitted specifications on his order. The exception applies only to manufacture and delivery on orders placed by or for the ultimate account of the Army, Navy, Maritime Commission or War Shipping Administration, where the particular service or agency has actually specified use of the specification in the first instance.

This interpretation applies to all provisions in the several schedules to Limitation Order L–272 which make reference to Army, Navy, Maritime Commission or War Shipping specifications.

Issued this 10th day of July 1943.

WAR PRODUCTION BOARD,
By J. JOSEPH WHELAN,
Recording Secretary.

L-272 Schedule VI

PART 3207—INDUSTRIAL TYPE INSTRUMENTS, CONTROL VALVES AND REGULATORS: SIMPLIFICATION

[Schedule VI to Limitation Order L–272]

WELDING EQUIPMENT GAUGES

§ 3207.7 *Schedule VI to Limitation Order L–272*—(a) *Definition.* A "welding equipment gauge" is any gauge which is designed and manufactured for use on oxyacetylene apparatus. This does not include any gauge for use on acetylene generators or compressed gas pipe lines and manifolds, nor does it include gauges

(2) Case material shall be zinc plated steel, with black finish inside and out.

(3) Screw ring shall be brass or plated steel, with black finish.

(4) Glass shall be beveled.

(5) Cupped litho silvered dial shall be used, and shall bear the legend: "Use no for regulators for the control of therapeutic gases or oxygen respiratory apparatus.

(b) *Specifications.* Welding equipment gauges shall be manufactured according to the following specifications only:

(1) Sizes shall be limited to 2-inch or 2½-inch dial diameter.

oil." High pressure gauge dials shall include a residual gas volume scale. No other service markings shall be used; but this does not mean that the gauge manufacturer may not put his name or trade mark on the gauge.

(6) Pressure ranges shall be limited to the following: 0–30 lbs.; 0–60 lbs.; 0–100 lbs.; 0–200 lbs.; 0–400 lbs.; 0–600 lbs.; 0–3000 lbs.

(7) All gauge models shall conform to such safety requirements as are prescribed for such gauges by the National Board of Fire Underwriters on August 1, 1943.

(c) *Special provisions.* (1) The exemption provisions of paragraph (c) (1)

of Limitation Order L–272 shall not apply to this schedule, which means that welding equipment gauges manufactured in all existing purchase orders must conform to these specifications. A producer may, however, sell or deliver any completed welding equipment gauges which he has on hand or use up any gauge parts which he has in stock on August 6, 1943.

(2) The provisions of paragraph (c) (2) of Limitation Order L–272 shall not apply to this schedule, which means that welding equipment gauges must conform to the above specifications notwithstanding anything that Limitation Order L–134 says with respect to the use of chromium or nickel in instruments and instrument parts.

Issued this 6th day of August 1943.

WAR PRODUCTION BOARD,
By J. JOSEPH WHELAN,
Recording Secretary.

M-50

PART 1023—JEWEL BEARINGS

[Conservation Order M–50, as Amended July 1, 1943]

Whereas, national defense requirements have created a shortage of jewel bearings (as hereafter defined) for the combined needs of defense and private account, and the supply of jewel bearings now is and will be insufficient for defense and essential civilian requirements, unless the supply of jewel bearings and jewel bearing material (as hereinafter defined) is conserved and their use in certain products manufactured for civilian use is curtailed; and it is necessary in the public interest to promote the defense of the United States, to conserve the supply and direct the distribution and use thereof.

Now, therefore, it is hereby ordered, That:

§ 1023.1 *Conservation Order M–50—*(a) *Definitions.* For the purpose of this order:

(1) "Jewel bearing material" means any natural sapphire or ruby of industrial quality, any synthetic sapphire, ruby, or spinel, or any other material of similar chemical composition and physical properties. Natural spinel is not included.

(2) "Jewel bearing" means any jewel bearing material which has been processed in any manner for use where friction occurs, including vees, rings, cups, endstones, pallet stones, roller pins, needles, stylii, cutters, nozzles, supports, tool bits, and dies.

(3) "Substitute jewel bearing" means a metal, agate, garnet, glass, or other bearing designed to replace or to substitute for a large ring bearing or a vee bearing of sapphire, ruby, or synthetic spinel.

(4) "Large ring bearing" means any jewel bearing or substitute jewel bearing through which a hole has been pierced from one parallel face to the other which has the following dimensions:

Outside diameter greater than	0.050 inch (1.270 mm.)
Thickness greater than	0.012 inch (.305 mm.)
Hole diameter greater than	0.006 inch (.152 mm)

(5) "Vee bearing" means any jewel bearing or substitute bearing which has a conically shaped cavity in one of the parallel faces.

(6) "Supplier" means any person who has engaged in the importation or processing of jewel bearings, substitute jewel bearings, or jewel bearing material, since January 14, 1942.

(7) "Consumer" means any person who uses jewel bearings or substitute jewel bearings in the manufacture of any article.

(8) "Processing" means manufacturing, fabricating, polishing, or modifying in any manner jewel bearing material or material designed to substitute therefor.

(9) "Blank" means preparage, rondel, cylinder, or prism made from jewel bearing material for the purpose of fabrication of a jewel bearing but which has not been drilled or formed.

(10) "Use" of a jewel bearing or substitute jewel bearing means to mount the jewel bearing in a screw or other setting, or to incorporate physically the mounted or unmounted bearing in a device where its normal bearing surface may be subjected to friction from a moving part or object.

(11) "Semi-fabricated jewel bearing" means any jewel bearing processed beyond the blank stage but on which additional processing is necessary before it is ready to be used by a consumer.

(12) "Finished bearing" means any jewel bearing or substitute jewel bearing which has been processed to a point where it can immediately be used by a consumer.

(13) "Implements of war" means combat end products, complete for tactical operations (including, but not limited to, aircraft, ammunition, armament, weapons, ships, tanks, and military vehicles), and any parts, assemblies, and materials to be incorporated in any of the foregoing items. This term does not include facilities or equipment used to manufacture the foregoing items.

(b) *Restrictions on delivery, processing, use, and sale.* (1) On and after November 2, 1942, each supplier shall set aside his entire stock, receipts, and production of finished jewel bearings, jewel bearing material, semi-fabricated jewel bearings, and blanks as a reserve for the fulfillment of present and future defense orders, and such other orders and uses as may be authorized from time to time by the War Production Board.

(2) No supplier shall make deliveries or withdrawals from such reserve either to his customers or for purposes of his own use, except as authorized by the War Production Board. The War Production Board will from time to time allocate the supply of finished jewel bearings, of semi-fabricated jewel bearings, or blanks, and of jewel bearing material; and may specifically direct the manner and quantities in which deliveries to or by particular persons or for particular uses shall be made or withheld. It may also direct, limit, or prohibit processing of jewel bearing material, blanks and semi-fabricated jewel bearings. It may also direct, limit, or prohibit deliveries, withdrawals from inventories, and particular uses of jewel bearings in the hands of consumers. It may also allocate the supply of finished substitute jewel bearings, or any particular kind thereof, in the hands either of suppliers or consumers, and may direct, limit, or prohibit deliveries, withdrawals from inventories, and particular uses of substitute jewel bearings. Such allocations and directions will be made to insure the satisfaction of the defense requirements of the United States, both direct and indirect, and they may be made, in the discretion of the War Production Board, without regard to any preference ratings assigned to particular contracts or purchase orders.

(3) Unless specifically directed or authorized by the War Production Board, no person shall sell or deliver to any person for any purpose vee bearings or large ring bearings of sapphire or ruby, except:

(i) That any person may sell such bearings to the person from whom he originally acquired them; and

(ii) That a wholesaler or distributor (but not a supplier) may sell or deliver large ring bearings to persons who will use such large ring bearings solely in the repair of watches or aeroplane instruments.

(c) *Additional restrictions on consumers—*(1) *Use of vee bearings and large ring bearings.* Unless specifically directed or authorized by the War Production Board, no person shall use vee bearings or large ring bearings of sapphire or ruby in the manufacture of any article other than:

(i) "Implements of war" as defined in this order, which are being produced for the Army or the Navy of the United States, the Maritime Commission, the War Shipping Administration, or for any foreign government pursuant to the act approved March 11, 1941, entitled "An Act to Promote the Defense of the United States" (Lend-Lease Act), where the use of vee bearings or large ring bearings of sapphire or ruby to the extent employed is required by the latest issue of government specifications (including performance specifications, unless otherwise directed by the War Production Board) applicable to the contract, subcontract, or purchase order; or such other articles or products being produced for any of the foregoing services, agencies, or foreign governments, as may be from time to time approved and designated by the War Production Board by means of supplementary orders: *Provided, however,* That no person in the manufacture of implements of war or other articles or products covered by this paragraph (c) (1) (i) shall use a vee bearing or a large ring bearing of sapphire or ruby in any place or application where the governmental contracting agency 30 days or more previously has issued a written statement to such person permitting the use of a substitute jewel bearing in such place or application: *Provided, further,* That any person who uses vee bearings or large ring bearings of sapphire or ruby, in order to meet performance specifications in the manufacture of any article or product covered by this paragraph (c) (1) (i), shall furnish such information with respect to such article or product and the specifications applicable

thereto as may be requested from time to time by the War Production Board.

(ii) Instruments for use in aeroplanes and ships.

(iii) Machine tools.

(iv) Dial indicator gages, being mechanisms for amplifying and measuring the displacement of a movable contact point, thereby measuring a dimension or variations from a standard dimension, each such gage comprising essentially a case with means for mounting the indicator, a spindle carrying the contact point, an amplifying mechanism, a pointer, and a graduated dial.

(v) Railroad standard watches, as such term is used and defined in Order L–175 of the War Production Board.

(2) *Use of substitute bearings.* On and after 30 days after November 2, 1942, unless specifically directed or authorized by the War Production Board, no person shall use jewel bearings of any type in the manufacture or repair of any article, other than those described in paragraph (c) (1) (i), in any place where it would be practicable, considering performance requirements, to use substitute jewel bearings, and in the repair of any such article no person shall replace a jewel bearing with a jewel bearing of any type if the bearing being replaced can be repaired or if it would be practicable, considering performance requirements, to use a substitute jewel bearing in its place.

(d) *General exception.* The prohibiting which on or after November 2, 1942, order shall not apply to any jewel bearing which on or after November 2, 1942, without violating any order of the War Production Board, had been physically incorporated in a device in which, without further assemblage, its normal bearing surface was subjected to friction from a moving part or object.

(e) *Appeal.* Any person affected by this order who considers that compliance therewith would work an exceptional and unreasonable hardship upon him, or that it would result in a degree of unemployment which would be unreasonably disproportionate compared with the amount of jewel bearings conserved, or that compliance with this order would disrupt or impair a program of conversion from non-defense to defense work, may appeal to the War Production Board by letter or other written communication, in triplicate, setting forth the pertinent facts and the reason he considers he is entitled to relief. The War Production Board may thereupon take such action as it deems appropriate.

(f) *Reports.* (1) Each supplier shall file with the War Production Board, Reference M–50, all information required on Form WPB–482 (formerly PD–235) on or before the dates therein prescribed.

(2) Each consumer shall file with the War Production Board, Reference M–50, all information required on Form WPB–465 (formerly PD–236) on or before the dates therein prescribed.

(3) Any person producing or offering for sale jewel bearing material shall file with the War Production Board, Reference M–50, all information required on Form WPB–675 (formerly PD–338) on or before the dates therein prescribed.

(g) *Miscellaneous provisions.*—(1) *Applicability of priorities regulations.* This order and all transactions affected thereby are subject to all applicable provisions of the priorities regulations of the War Production Board, as amended from

(2) *Communications to War Production Board.* All reports required to be filed hereunder, and all communications concerning this order, shall, unless otherwise directed, be addressed to: War Production Board, Miscellaneous Minerals Division, Washington, D. C. Ref.: M–50

(3) *Violations.* Any person who wilfully violates any provision of this order or who, in connection with this order, wilfully conceals a material fact or furnishes false information to any department or agency of the United States is guilty of a crime, and upon conviction may be punished by fine or imprisonment. In addition, any such person may be prohibited from making or obtaining further deliveries of, or from processing or using, material under priority control and may be deprived of priorities assistance.

Issued this 1st day of July 1943.

WAR PRODUCTION BOARD,
By J. JOSEPH WHELAN,
Recording Secretary.

P-43

PART 3277—LABORATORIES

[Preference Rating Order P–43, as Amended June 26, 1943]

For the purpose of facilitating the acquisition of material for laboratories and to promote the national defense, preference ratings and an allotment symbol are hereby assigned to deliveries of such materials under the terms and within the limitations hereinafter set forth:

§ 3277.1 *Preference Rating Order P–43*—(a) *Definitions.* For the purposes of this order:

(1) "Laboratory" means any person engaged in the business of carrying on scientific or technological investigation, testing, development or experimentation, to the extent that he is so engaged. The term includes research laboratories, production control laboratories, testing laboratories, analytical laboratories, clinical laboratories, and instructional laboratories. It does not include any person to the extent that he is engaged in the manufacture of products for commercial sale, even though the place in which the products are manufactured may be called a laboratory. "Serial-numbered laboratory" means a laboratory which has been assigned a serial number under this order by the War Production Board pursuant to application on Form WPB–167 (formerly Form PD–107). (Application for a serial number must be made in accordance with the terms of paragraph (e) of this order.) "Non-serial-numbered laboratory" means any laboratory other than a serial-numbered laboratory.

(2) "Material" means any commodity, equipment, accessory, part, assembly or product of any kind. The term includes, but is not limited to, maintenance, repair and operating supplies for laboratories, equipment and instruments designed for use in laboratories, and other materials needed to carry on scientific or technological investigation, testing, development or experimentation. The term does not include chemicals prepared and packed for reagent use, which may be obtained in the manner provided in Order P–135.

(b) *Method of obtaining controlled materials.*—(1) *Steel and copper.* Any laboratory needing any controlled material (as defined in CMP Regulation 1), except aluminum, for carrying on scientific or technological investigation, testing, development or experimentation, may obtain the same by using the allotment symbol MRO–P–43 and by placing on his purchase order substantially the certification set forth in paragraph (d) of this order (or the alternative form of certification provided in CMP Regulation 7). The allotment symbol assigned by this paragraph (b) constitutes an allotment symbol for the purposes of CMP Regulation 3, and an order for controlled material bearing the certification set forth in paragraph (d) constitutes an authorized controlled material order.

(2) *Aluminum.* (i) Any laboratory needing aluminum in any of the forms or shapes constituting a controlled material, for carrying on scientific or technological investigation, testing, development or experimentation, where the use of other materials is impracticable, may obtain the same from a controlled materials producer or from a distributor specifically authorized by the War Production Board to engage in the business of receiving aluminum for sale or resale, in an amount of not to exceed 100 pounds from all sources during any one calendar quarter: *Provided*, That any order placed pursuant to this paragraph (b) (2) shall be accompanied by the following certification (or the alternative form of certification provided in CMP Regulation 7) signed manually or as provided in Priorities Regulation 7:

CMP allotment symbol MRO–P–43. The undersigned certifies, subject to the criminal penalties for misrepresentation contained in section 35 (A) of the United States Criminal Code, that the materials covered by this order are required to carry on scientific or technological investigation, testing, development or experimentation; that the use of other materials for such purposes is impracticable; that the amount of aluminum covered by this order together with the other amounts received by, or on order for delivery to the undersigned, from all sources, for such purposes during the same quarter, will not exceed 100 pounds; and that this order is placed in compliance with Preference Rating Order P–43.

Name_____
By_____
Authorized Official
Date_____

Any producer or warehouse receiving an order bearing such certification shall be entitled to rely thereon and may fill the order, unless he knows or has reason to believe the certification to be false. An order bearing such certification constitutes an authorized controlled material order.

(ii) Any laboratory needing aluminum in any of the forms or shapes constituting a controlled material in amounts aggregating more than 100 pounds from all sources during any one calendar quarter for carrying on scientific or technological investigation, testing, development or experimentation, where the use of other materials for such purpose is impracticable, may apply for an allotment of the amount thereof in excess of 100 pounds during any one calendar quarter by letter addressed to the Aluminum and Magnesium Division, War Production Board, Washington, D. C., Ref: LAB. The letter should con-

substantially the information called by paragraphs (d) (1) to (d) (6) of Supplementary Order M–1–i, as amended March 10, 1943. If the application is granted, the applicant will receive an allotment number or symbol, and may place an authorized controlled material order by endorsing his order with such allotment number or symbol and the certification prescribed in paragraph (s) (3) of CMP Regulation 1 or in CMP Regulation 7, executed as provided in such regulations.

(c) *Method of obtaining materials other than controlled materials.* Laboratories needing any materials other than controlled materials (regardless of whether such other materials are Class A products, Class B products or other products or materials) for carrying on scientific or technological investigation, testing, development or experimentation, are hereby assigned preference ratings for deliveries of such materials as follows:

(1) Serial-numbered laboratories and laboratories owned or operated by the Army or Navy of the United States: AA–1.

(2) Non-serial-numbered laboratories: AA–2.

A laboratory may apply the preference rating hereby assigned by placing on his purchase order substantially the certification set forth in paragraph (d) of this order (or the alternative form of certification provided in CMP Regulation 7).

(d) *Method of using allotment symbol and of applying and extending preference ratings.* (1) A laboratory may use the allotment symbol assigned by paragraph (b) (1) of this order and may apply the preference rating assigned by paragraph (c) of this order by placing on his purchase order substantially the following certification (or the alternative form of certification provided in CMP Regulation 7), signed manually or as provided in Priorities Regulation 7:

Preference rating ------; CMP allotment symbol MRO–P–43; Serial No. ------ (show serial number under P–43, if one has been assigned). The undersigned certifies, subject to the criminal penalties for misrepresentation contained in section 35 (A) of the United States Criminal Code, that the items covered by this order are required to carry on scientific or technological investigation, testing, development or experimentation, and that this order is placed in compliance with Preference Rating Order P–43.

Name----------

By----------

Date---------- Authorized Official.

(2) A purchase order bearing the above certification shall have the status of a purchase order bearing a preference rating with an allotment symbol as provided in CMP Regulation 3. A person with whom a purchase order is placed bearing a preference rating assigned by this order may, subject to the limitations contained in CMP Regulations 1 and 2, extend the rating in the manner provided in CMP Regulation 3 (using the endorsement therein specified or the alternative form of certification provided in CMP Regulation 7).

(e) *Assignment of serial numbers.* Any laboratory desiring a serial number under this order may apply to the War Production Board on Form WPB–167 (formerly Form PD–107), in triplicate, for the assignment of a serial number. Serial numbers will be assigned only to laboratories which are engaged in research or production control activities which are essential to the prosecution of the war. Serial numbers which heretofore have been assigned or hereafter are assigned to any laboratory may be revoked by the War Production Board at any time.

(f) *Reports by serial-numbered laboratories.* On or before July 15, 1943, and on or before the 1st day of every calendar quarter after July 1, 1943, unless otherwise directed by the War Production Board, each serial-numbered laboratory shall file with the War Production Board a report on Form WPB–167, setting forth the principal activities of the laboratory and all other information required by the form.

(g) *Limitation on use of preference ratings.* The preference ratings assigned by this order shall not be applied or extended to the delivery of any item appearing on List A, B or C of Priorities Regulation 3, except as specifically permitted in List B with respect to laboratory instruments and equipment.

(h) *Effect on other orders.* (1) Except as otherwise provided herein, nothing in this order shall be construed to relieve any laboratory from complying with any applicable regulation or order of the War Production Board (including orders in the "E", "L" and "N" series) or with any order of any competent authority. Specifically, the assignment of preference ratings and an allotment symbol by this order does not relieve any laboratory from complying with the provisions of Limitation Order L–144 with respect to laboratory equipment (as defined therein).

(2) The quantity restrictions set forth in paragraph (f) of CMP Regulations 5 and 5A shall not be applicable to any laboratory obtaining material under this order.

(i) *Inventory restrictions.* No laboratory shall at any time accept delivery of any material (whether or not such material is obtained pursuant to this order) if the laboratory already has a practicable minimum working inventory thereof or if the acceptance of the material will cause such laboratory to have an inventory of the material in excess of a practicable working minimum, as provided in section 944.14 of Priorities Regulation 1. Furthermore, no laboratory shall accept delivery of any controlled material if acceptance of the controlled material would cause him to violate the inventory limitations of CMP Regulation 2.

(j) *Use of other ratings or allotment numbers or symbols.* Nothing contained in this order shall prevent any laboratory from using any ratings or allotment numbers or symbols which he may be entitled to use by reason of any preference rating certificate or any other order or regulation of the War Production Board; but the ratings assigned by this order shall be effective, notwithstanding the provisions of paragraph (k) (1) of CMP Regulation 5 and paragraph (l) (1) of CMP Regulation 5A.

(k) *Penalties for misrepresentation or diversion.* (1) The placing of any order bearing a certification or symbol as provided by this order shall constitute a representation, subject to the criminal penalties of section 35 (A) of the United States Criminal Code (18 U. S. C. 80), that the person placing the order is entitled, under the terms of this order to use of the symbol or preference rating indicated thereon.

(2) No person shall use for any purpose other than the carrying on of scientific or technological investigation, testing, development or experimentation, any material obtained under this order, nor use any material obtained under a preference rating assigned by this order for a purpose to which a lower rating, or no rating, is assigned. Any such use shall constitute a crime punishable by fine or imprisonment or both. Physical segregation of inventories is not required, but the restrictions applicable to any specific lot of material or product must be observed with respect to an equivalent amount of the same material or product.

(l) *Records.* Each laboratory acquiring materials pursuant to this order shall keep and preserve, for a period of not less than two years, accurate and complete records of all materials so acquired. Such records shall, upon request, be submitted to audit and inspection by a duly authorized representative of the War Production Board.

(m) *Communications to War Production Board.* All communications concerning this order and all applications and reports shall, unless otherwise directed, be addressed to: War Production Board, Safety and Technical Equipment Division, Washington, D. C., Ref: P–43.

Issued this 26th day of June 1943.

WAR PRODUCTION BOARD,
By J. JOSEPH WHELAN,
Recording Secretary.

P-133

PART 3037—ELECTRONIC EQUIPMENT

[Preference Rating Order P–133 as Amended Feb. 4, 1943]

§ 3037.5 *Preference Rating Order P–133*—(a) *Definitions.* For the purpose of this order:

(1) "Operator" means any individual, partnership, association, business trust, corporation, receiver or any form of enterprise whatsoever, whether incorporated or not, the United States, and the several states thereof, and any political, corporate, administrative or other division or agency thereof, to the extent engaged in any activity listed in Schedule A, hereof.

(2) "Material" means any commodity, equipment, accessory, assembly or product of any kind; exclusive, however, of automotive replacement parts as defined by General Limitation Order L–158.

(3) "Maintenance" means the upkeep of an operator's buildings, structures and equipment in sound working condition; and this, without regard to whether the expenditures therefor are for any reason required to be recorded in the operator's accounting records in accounts other than maintenance and repair.

(4) "Repair" means the reconstruction or restoration without expansion, improvement or change of design of any portion of an operator's buildings, structures and equipment when such portion

has been rendered unsafe or unfit for service by wear and tear or other similar causes, but not including reconstruction or restoration of any portion damaged or destroyed by fire, flood, tornado, earthquake, act of God or the public enemy; and this, without regard to whether the expenditures therefor are for any reason required to be recorded in the operator's accounting records in accounts other than maintenance and repair.

(5) "Operating supplies" means any material which is essential to and consumed directly in the operation of any of the services specified in paragraph (a) (1) above, but does not include photographic film, fuel, office or building supplies, or any material which is physically incorporated in whole or in part in the property or equipment of the operator.

(b) *Assignment of preference rating.* Subject to the terms of this order, preference rating of AA-2X is hereby assigned:

(1) To deliveries of material to an operator for operating supplies and for maintenance and repair.

(2) To deliveries to any supplier of material to be physically incorporated in other material required by an operator for operating supplies, maintenance or repair.

(c) *Persons entitled to apply preference rating.* The preference rating hereby assigned shall be applied where a preference rating is required to obtain material for maintenance, repair and operating supplies by:

(1) Any operator engaged in an activity in Schedule A hereof and may be applied by

(2) Any supplier, provided deliveries to an operator or another supplier are to be made by him, which are of the kind specified in paragraph (b) and have been rated pursuant to this order.

(d) *Applicability of priorities regulations.* This order and all transactions affected thereby are subject to all applicable provisions of the priorities regulations of the War Production Board, as amended from time to time.

(e) *Restrictions on inventory and use.* The preference rating hereby assigned may be applied by any operator, provided:

(1) Such rating is not used to replace in inventory more than one spare tube for each active tube socket.

(2) Such rating is not used to replace in inventory any spare parts except:

(i) Those subject to frequent failure, deterioration or other exhaustion.

(ii) Those which are so unique that failure would inevitably result in long delay in resumption of essential operations.

(3) Such rating is not used in any case to increase the value of an operator's inventory of repair parts, other than tubes, above the value of such inventory on the date of this order.

(4) Such rating is not used to replace in inventory a new part if the defective part can be repaired with a smaller consumption of raw material.

(5) The tube which has been replaced from operator's inventory or for which replacement is required has been operated to failure.

(6) The operator has returned to the manufacturer any power tube rated at 25 watts or more which has failed, unless such tube is to be repaired.

(7) Equipment which has failed has been operated within the ratings specified by the manufacturer.

(8) Such rating is not used to build up inventory of operating supplies other than tubes, in excess of requirements for a three-month period

(9) Such operator was actively engaged in one of the activities listed on Schedule A hereof, on the date of issuance of the order, or has received specific authorization for his installation from the Director General for Operations of the War Production Board.

(f) *Application and extension of rating.* An operator or supplier, in order to apply the preference rating assigned by this order, shall endorse the following statement on the purchase order or contract for such material signed manually or as provided in Priorities Regulation No. 7 (§ 944.27) by an official duly authorized for such purposes.

CERTIFICATION

The undersigned purchaser hereby represents to the seller and to the War Production Board that he is entitled to apply/extend the preference ratings indicated/posite the items shown on this purchase or and that such application or extension is accordance with Priorities Regulation No as amended, with the terms of which undersigned is familiar.

Name of purchaser ---------- Address ----------

By ----------

(Signature and title of duly authorized officer) ---------- Date ----------

(g) *Violations.* Any person who wi fully violates any provision of this orde or who, in connection with this orde wilfully conceals a material fact or fu nishes false information to any depar ment or agency of the United States guilty of a crime, and upon convicti may be punished by fine or imprison ment. In addition, any such person m be prohibited from making or obtainin further deliveries of, or from processi or using material under priority contr and may be deprived of priorities assis ance.

(h) *Records.* All operators assigne a preference rating by or pursuant t this order shall keep and preserve fo two years copies of all purchase order or contracts applying such rating.

(i) *Reports.* All operators affected b this order shall execute and file with th War Production Board such reports an questionnaires as the War Productio Board shall from time to time prescrib

(j) *Communications.* All reports t be filed, and other communications con cerning this order, should be addresse to War Production Board, Radio an Radar Division, Washington, D. C. Ref P-133.

Issued this 4th day of February 1943.

CURTIS E. CALDER,
Director General for Operations.

SCHEDULE A

1. Radio communication, including broadcasting.
2. Sound recording for commercial purposes.
3. Radio direction finding.

Instrument DIALS AND SCALES
ETCHED OR LITHOGRAPHED IN ALL FINISHES
OUR 30 YEARS EXPERIENCE ASSURES BEST QUALITY & PROMPT PERFORMANCE.
NAMEPLATES • PANELS *etc.*
AND ON ANY METAL
PREMIER METAL ETCHING COMPANY
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Introducing

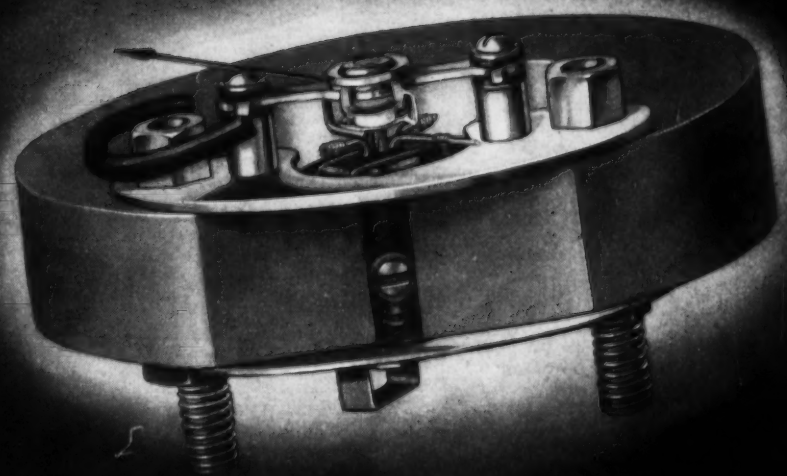
INTERNAL-PIVOT ELECTRIC INSTRUMENTS

oltmeter in a etal case. ypical of DW- 1 and DW-52 nstruments. lso available molded Tex- olite case.

TYPE DW-51 D-c Voltmeters, Ammeters, Milliammeters, and Microammeters

TYPE DW-52 Radio-frequency Ammeters and Milliammeters (A-c Thermocouple Types)

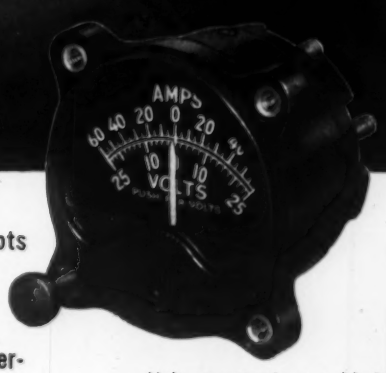
TYPE DW-53 D-c Voltmeters, Volt-ammeters, and Ammeters for Naval Aircraft



ELEMENT ASSEMBLY

(Approx twice actual size)

Note the clean, simple lines of this compact element, made possible by the internal-pivot construction and by securing all parts solidly to the cast-comol magnet.



Volt-ammeter in a molded Textolite A-N case, typical of DW-53 instruments for aircraft

for **THINNESS** obtained by the use of internal pivots—pivots mounted on the inside of the armature instead of the outside

with **HIGH FACTOR OF MERIT**—resulting from a feather-weight moving element and relatively high torque

THESE new instruments are especially well suited for use in radio, other communications equipment, and naval aircraft—wherever d-c or r-f measurements are desired. In most ratings, they are approximately one inch deep.

Thinness is obtained by the internal-pivot construction. But this design affords much more than thinness.

The elements, on account of their high torque and large-radius pivots, are well able to withstand vibration. High torque combined with a lightweight moving element results in fast response. Good damping makes for ease and accuracy of reading. Large clearances help to insure reliable operation.

All these features add up to a high factor of merit and all-around fine performance.

For complete information on ratings, prices, dimensions, and specifications, ask the nearest G-E office for Bulletins GEA-4064 and 4117, or write to General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

"Sampling" the breeze

AVIATION "experts" once opposed enclosing the pi in a cockpit, claiming he needed to feel the rush air upon face and body in order to tell what his pla was doing. Today the pitot-static tube protruding fr wing or fuselage does this job with a lot more accura and dependability, transmitting dynamic and static pressures to the instrument panel for the operation the air speed indicator, the rate-of-climb indicator a the altimeter. Its rain- and-ice-proof construction assu accurate and continuous functioning under all weath conditions. The design and construction of Kollsm pitot-static tubes are representative of the skill th goes into all Kollsman precision aircraft instrumen long supplied for military and civil aviation.

THE CARGO PLANES OF TOMORROW *will differ in ma respects, depending upon the service they are to perfor But there is one thing they will all have in common: instr ments will play a tremendous part in their scope and us fulness. Kollsman engineers are constantly developing ne and better aircraft instruments which will help widen a extend tomorrow's skyways for a new era in aviation.*

KOLLSMAN ELECTRICALLY HEATED PITOT-STATIC TUBES *are specially designed so that they are aerodynamically, mechanically, and thermally correct. Their construction ensures the faithful transmission of pitot and static pressures at all speeds and through all angles of pitch and yaw up to 16 degrees.*

KOLLSMAN AIRCRAFT INSTRUMENTS

PRODUCT OF

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ELMHURST, NEW YORK • GLENDALE, CALIFORNIA

APPLICATIONS OPERATING PRINCIPLES INSTALLATION MAINTENANCE

Aviation Instruments

Navigation Automatic-piloting Power plant Automatic-landing Aerological
Communication Flight-testing Production Instrument-testing

Vol. II, No. 8 M. F. Behar, Editor September 1943

AIRCRAFT INSTRUMENT GUILD

INTERNATIONAL HEADQUARTERS

812 N. DELAWARE PLACE
TULSA, OKLAHOMA

The following articles have been contributed by the Aircraft Instrument Guild. For further information on any of the subjects discussed, write to the Guild at the above address.

Help Wanted

By R. G. OJERS
Guild President

FROM the depth of darkness of inexperience into the early dawn of knowledge gained by perseverance, the embryo instrument mechanic is taking form, shaping up as a skilled craftsman who not long ago was considered just a protoplasm of mechanic material—a way to a means: instrument operation. At times these operations were vague, to say the least. We could overhaul our units, so that they would calibrate perfectly and perform properly, but the duration of this performance was problematical. One instrument would operate four hundred hours or more, another of the same type would last forty hours or less.

We had to become accustomed to their idiosyncracies—a little more tolerance here, a little extra tension there, replacing steel bearings with jewels, using pinion and sector gears instead of sliding leverage action—even to replacing, in some instances, mechanical instruments with electrical; and combining various instruments in one compact unit, saving space and increasing their quality.

With the improvement of instruments, the mechanic has shown great advancement. The difference lies in the fact that instruments are general. The mechanic has to specialize, so in specializing, let's be the best specialists in the world; first, because so much is dependent upon us: the lives of the people involved, plus the equipment—to enable both to get where they are due without delay—from the standpoint of war as well as commercial operators.

Since specializing is becoming so important and emphasized so highly that everyone gains a great advantage but the individual mechanic. Why? Because we all know that our advance and promotion depend on our ability and on our knowledge of as varied instrument work as possible. What operator wants a foreman that knows only how to lap a pivot or assemble an airspeed, or trouble-shoot an installation? By the same token I have yet to discover an operator that would fire a mechanic for attempting to better himself in the never-ending hunt for more knowledge. There is no worth-while foreman that is afraid one of his mechanics will take his job. His only worry is that he will have no suitable material to take his place when he is offered a promotion, so let's aim for the job just above the one we now hold. How can we do this? By striving for more knowledge.

There are a number of ways this can be accomplished, many of which you already know. One way is to get material direct from the factory. (The Aircraft Instrument Guild is working on this and hope to obtain such material soon.) Another way is through the exchange of ideas. One of our members, Simon S. Jackel of New Haven, Connecticut, has promised an article on the Fuel Mixture Indicator. (How many of you know all there is to know about these—even those of you who work on them constantly?) Ray Stephan of the Pioneer Instrument Company had some ideal material in the August issue of *Instruments*—a good, down-to-earth article on magnetism and electricity; and also a little trick-of-the-trade: modifying a buzzer to eliminate noise. (The latter seems simple but haven't all of you at some time or other gritted your teeth at the raucous sounds of a buzzer with laryngitis and asthma at the same time?)

The point I'm driving at is this: don't be backward about submitting information that will help us all perform our work a little better, a little faster.

Remember, there is no such thing as a *self*-made man, whether he be doctor, lawyer, merchant or mechanic. We pay large sums of money to schools to start us on our career and we would be completely lost without other persons to help us over high spots and lend us some of the benefits of their experiences to pull us through the swampy morass of our own inexperience.

You may feel you have worked hard and long to get where you are, so you rear back on your haunches and say "Let the others get theirs the same as I." Very well. Just stay there and see how long you last in this field of ours. You will find few lead mechanics with this attitude, fewer assistant foremen and no foreman. The few self-centered men won't go higher, you can bet.

There is a lot of room for the so-called self-made man at the bottom and there is also a lot of room at the top for men ready to be made, but we have to coöperate, not only with ourselves but others. We have to pay in some form or other. Our method is experience gained through barter—by trading our own known ideas for others, using the Aircraft Instrument Guild for a medium of exchange.

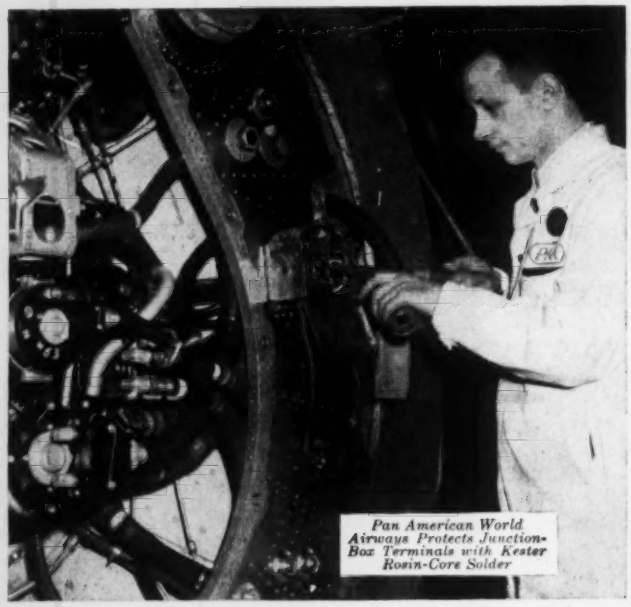
The A.I.G. Q&A Column

By GENE HONEYCUTT
Recorder, Aircraft Instrument Guild

Q. How can a thermocouple instrument be calibrated with a 0 to 5 milivoltmeter?

A. Use a two-ohm potentiometer, one leg (a) grounded, the opposite side (b) to miliammeter, the center tops (c) to the milivoltmeter, the other side of milivoltmeter to ground. The resistance from (a) to (b) equals the leads resistance of the instrument to be tested. By adjusting the potentiometer, the miliammeter may be read directly in milivolts and checked against the milivoltmeter as high as five

GONE—One Gremlin



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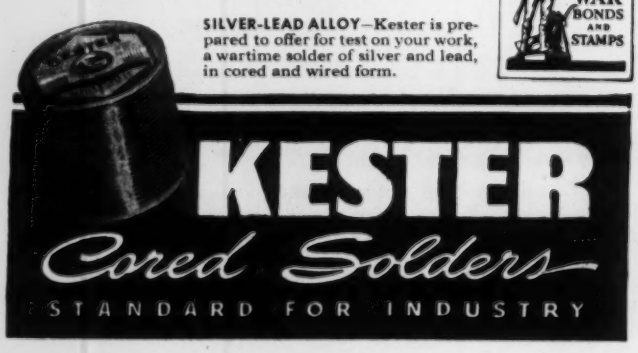


milivolts, at which time the milivoltmeter may be disconnected and the miliammeter read directly in milivolts up its full scale.

* * *

Q. Our problem is the Carburetor Temperature Mixture. The spools check according to specifications, the Wheatstone Bridge balances mathematically, and both the windings of moving coils check OK. Yet, even when the external resistance equals the bulb resistance the pointer snaps to the extreme left.

A. If everything is OK as you have stated, the wrong side of the bulb is grounded.

* * *

Q. How long should the Jaeger Tachometer movement continue to run after it has been taken off of the tester indicating 1600 r.p.m.?

A. The action of a good mechanism should continue to run from five to six seconds (provided the mainspring is in good condition), if disconnected while tester indicates 2 or more r.p.m.

* * *

Q. What would be the simplest method to use for magnetizing the magnet in the Weston Type E-12, A-c. Electric Tachometer Generator? (J. G., Dallas, Tex.)

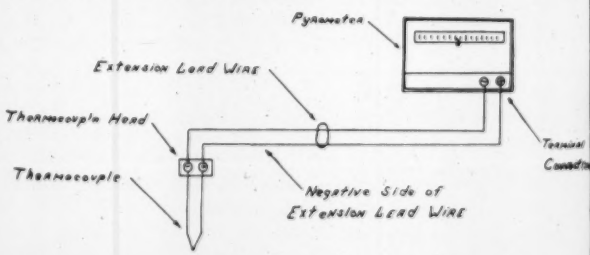
A. This is a question that should prove an inspiration for a good article on procedure of overhaul, calibrating and testing of the above units.

Determining Polarity of Extension Leads

By ALBERT A. JACOBS
Instrumentation Engineer, Brown Instruments Div., Minneapolis-Honeywell Regulator Co., Milwaukee, Wis.

EXTENSION lead wire is used in conjunction with potentiometer and millivoltmeter pyrometers for removing the cold junction from the thermocouple head to the instrument where compensation is usually effected. The material composing extension lead wire used with any thermocouple has the same thermoelectric properties as the thermocouple itself.

A considerable error of temperature measurement can result when the extension lead wire is reversed as shown



in the diagram. I have found that this error may vary from zero to a maximum of approximately 200°F., depending upon the hot junction temperature, the thermocouple head temperature, and the temperature of the instrument itself.

Instrument manufacturers have a color code system for identifying the proper polarity of their lead wire. However this system is not standardized and often leads to confusion in a plant where different makes are used.

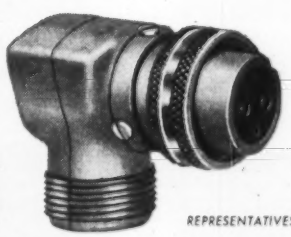
In order to identify the polarity of lead wire easily, disconnect the wire from the thermocouple at the thermocouple head. The bare wires are then twisted together and enough heat applied to make the pyrometer pointer or pen read upscale. If it tends to move downscale, reverse leads at the instrument. After the proper connection is made at the instrument, connect the thermocouple so that the pointer or pen moves upscale when heat is applied at the hot junction. Errors due to improper use of the extension lead wire are now eliminated.

"Coming in..Cincinnati.."

One of the most ingenious aids to air navigation is the automatic direction finder. With this radio device, the pilot can accurately determine the bearing of a transmitting station.

Naturally, this direction indicator, like other indicators and gauges on the instrument panel is only as accurate as the dependability of its electrical circuits.

Cannon Connectors are an essential part of many electrically operated instrument circuits. Because they have been found 100% dependable in operation under all conditions, Cannon Connectors have become an integral part of the aircraft industry.



nnon Types K and AN nnectors are both ideally ted for instrument circuits. g shown, WK-C3-23-½AN.

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Canadian Factory and Engineering Office: Cannon Electric Co., Ltd., Toronto

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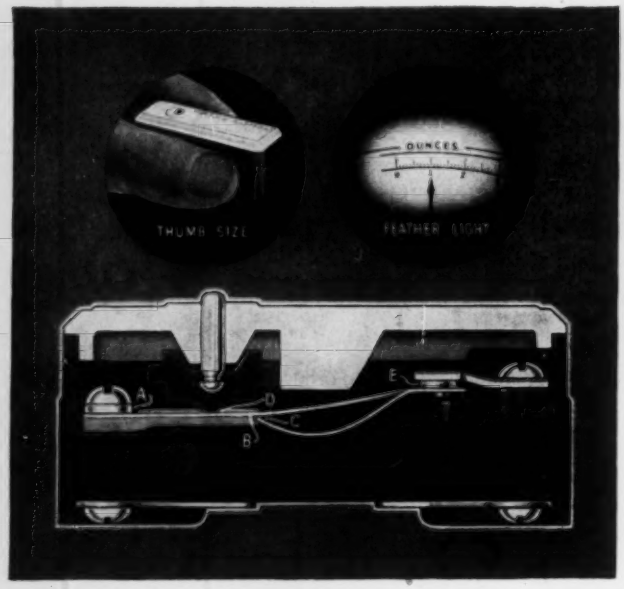
Photo courtesy TWA

WRITE FOR NEW "AN" BULLETIN—A revised 82-page illustrated bulletin on Cannon AN Connectors, giving complete information on the entire AN line is available. Your copy will be mailed on request.

Write Department A-123, Cannon Electric Development Company, Los Angeles 31, California.



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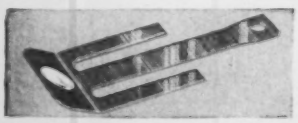
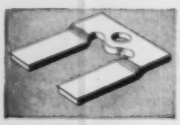
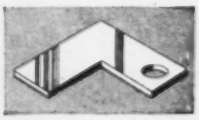
The Micro Switch design incorporates features that provide desirable performance characteristics not generally found in snap-action switches . . . The heat-treated beryllium-copper spring bends in the same direction as the operating plunger—no reverse bends—no "oilcan" action . . . gives longer switch life—accurate repeat action—increased contact pressure—lightning-fast action—millions of operations on minute movement and force differentials. It is the choice of design engineers for all types of sensitive instruments.



The beryllium-copper spring is made in one piece. It is gauged to an accurate .0085" thickness; has high resistance to fatigue. Ends of compression members are finished to provide an extremely low friction bearing. Contact end of the spring is fitted with a riveted radius type contact of 99.95% fine silver. It moves at a speed of 3/1000ths to 5/1000ths of a second with a rolling action and extremely high pressure.



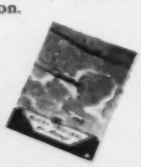
Short spring members pivot in patented V-grooves of this sturdy brass anchor. Note the special shape of these grooves, which reduces friction to a minimum.



Stationary contact is a flat inlay of 99.95% fine silver. This construction assures ample over-load capacity and maximum heat dissipation.

Operating plunger is a highly polished stainless steel pin imbedded in an accurately moulded star-shaped Bakelite head. Provides long over-surface path to live parts, thus insuring freedom from electrical leakage. Plunger head cannot rotate within the housing, insuring against any variation in point of operation.

If you would like to know more about the Micro Switch, send for the two Handbook-Catalogs illustrated here—No. 60, which covers Micro Switches in general; and No. 70 which deals with specific Micro Switches for use in aircraft. © 1941



Micro Switch is a trade name indicating manufacture by Micro Switch Corporation

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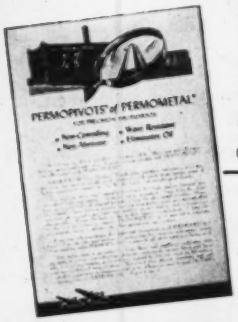

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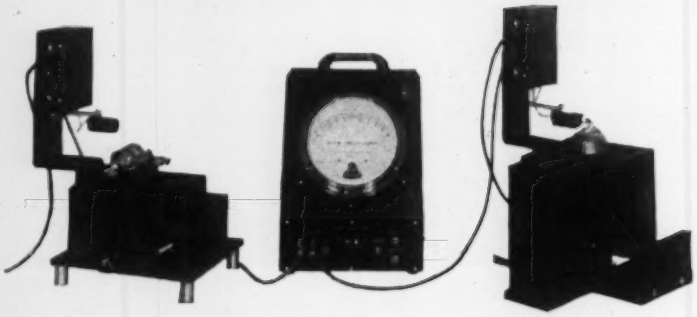

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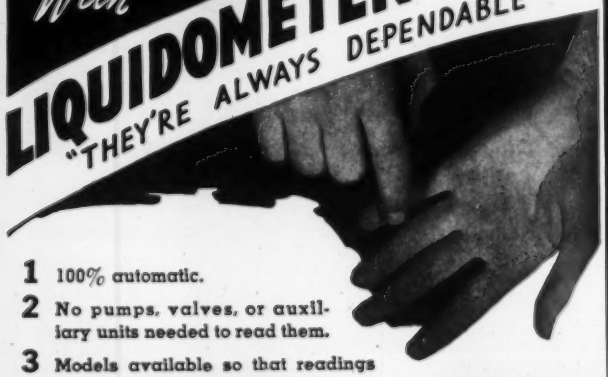

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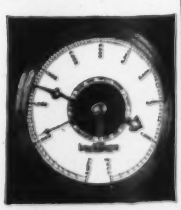

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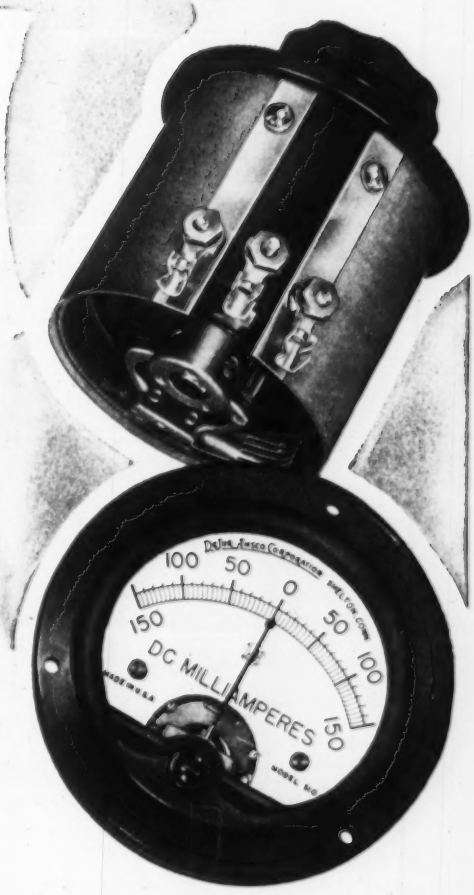

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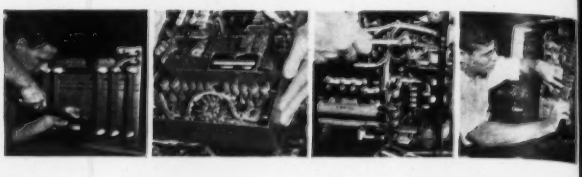

The Ward Leonard, Vitreous Enamel, Wire Wound Resistors, shown, are used on maintenance and operation equipment at the Miami Clipper base of Pan American World Airways.

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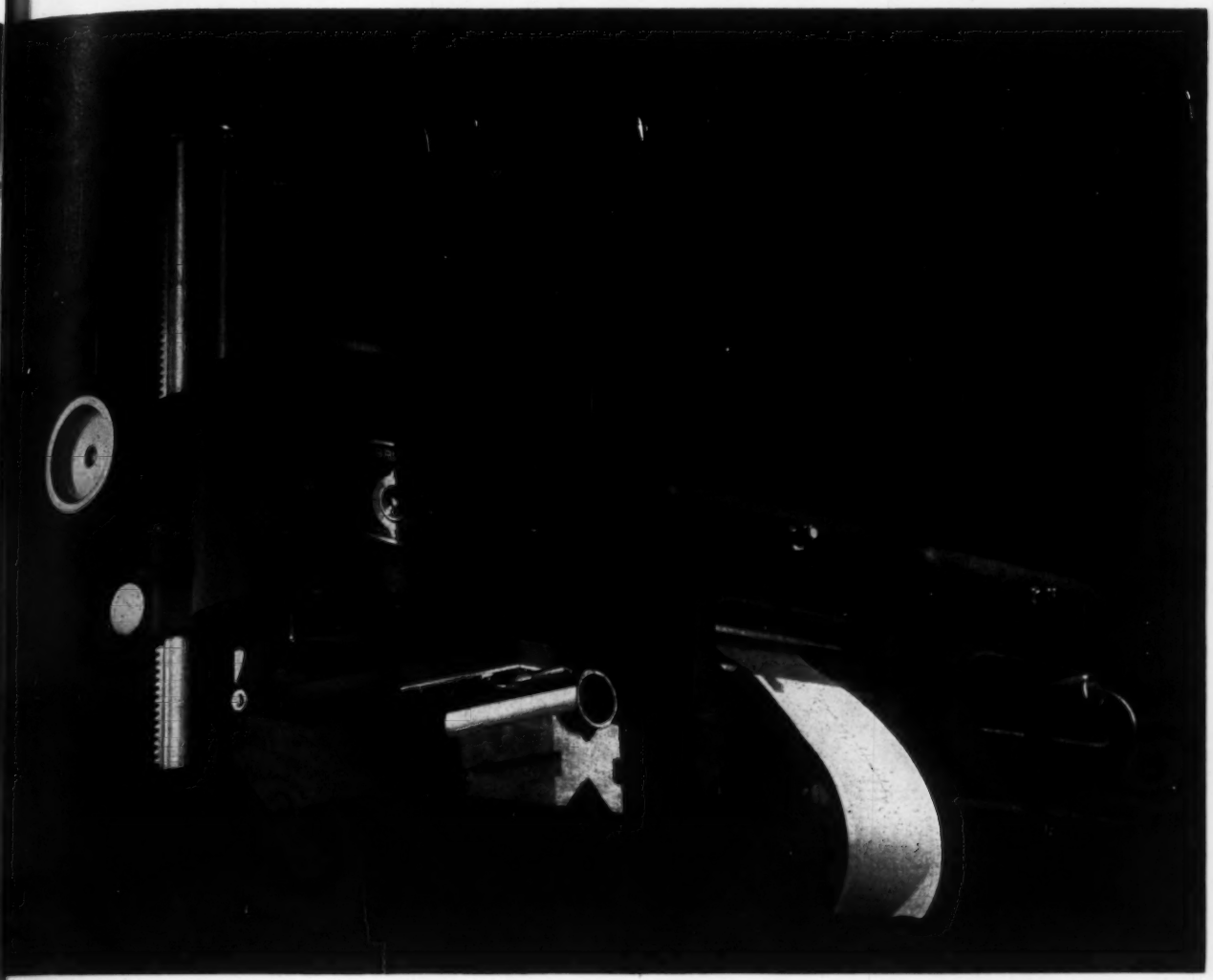

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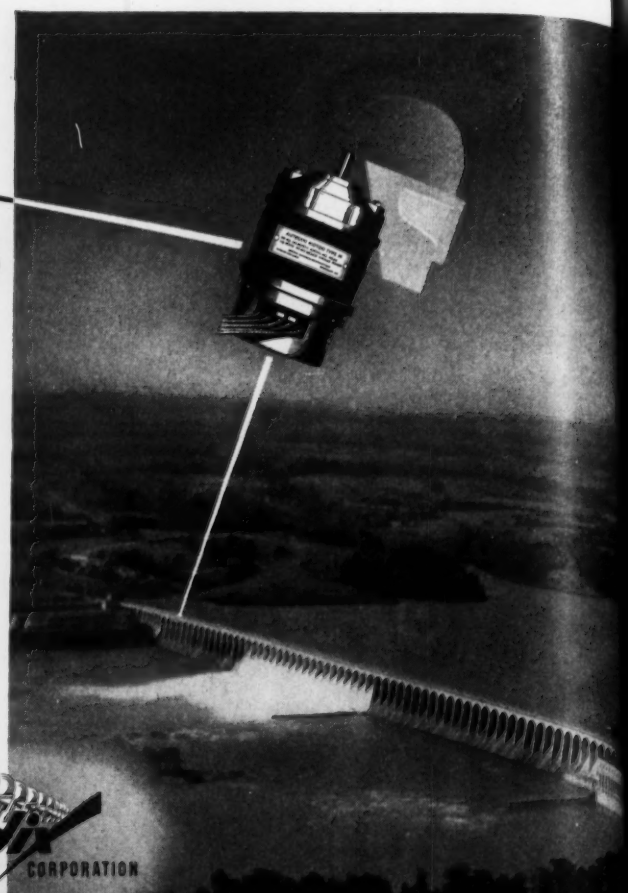

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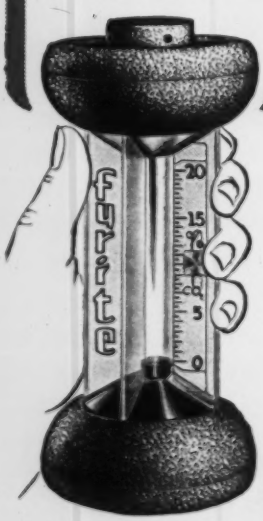

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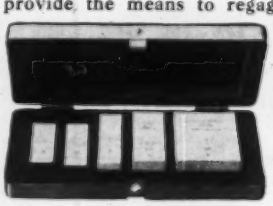
MEASURING THE INVISIBLE

THE accuracy of Johansson Gage Blocks is within millionths of an inch—the world's highest standard of precision measurement—a limit much finer than a human hair and invisible to the naked eye. For today's close limits on machined products, Johansson Blocks provide the means to regage your shop for extreme precision at minimum expense. They're priced as low as $23.00 for sets and $3.50 for individual blocks. For full details, prices and lists of accessories write for free catalog.

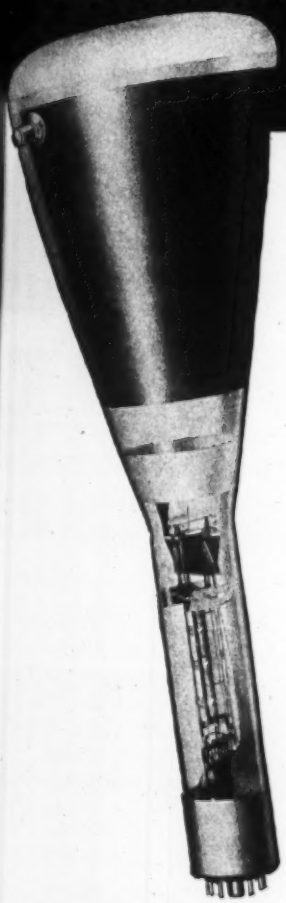


Johansson Gage Blocks and Accessories

Ford Motor Company, Johansson Div.
Dept. I-9 Dearborn, Michigan

As millions of controls are *Electronically* tested . . .

DuMONT CATHODE-RAY TUBES score over 5000 hours of trouble-free service



★ Hour after hour, day-in day-out, DuMont cathode-ray tubes check Clarostat controls coming off the production line. The single-dot trace meandering diagonally across the screen in response to resistance vs. rotation, provides "all the answers" at a glance for inspectors and engineers alike.

In several Clarostat-designed test positions, DuMont tubes check controls ranging from 1000 ohms to 10 megohms. Resistance curve, taper, hop-off, transition points or ink blends, flaws or cracks, possible noise sources, useful rotation — these are checked visually, positively, quickly; far better than with the usual earphone test.

In such service for several years past, DuMont tubes have already scored well over 5,000 hours each, and are still going strong, *without a single failure or replacement.* Compared with the 50-hour life expectancy of early tubes, this tells the story of a decade of remarkable engineering and production refinement, as well as the exceptionally high vacuum of DuMont tubes.

Altogether a typical industrial application which, because of the hour-after-hour operation, provides convincing evidence of DuMont tube life. And especially significant today when such tubes are used for many *continuous-service* functions.

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We process with luminescent compounds, all types of dials and other devices, in metals, plastics and glass, according to the latest Army and Navy specifications. Our perfected laboratory methods ensure uniform accuracy and durability of applied numerals, lettering and calibrations. Information and estimates on your specifications furnished promptly on request.

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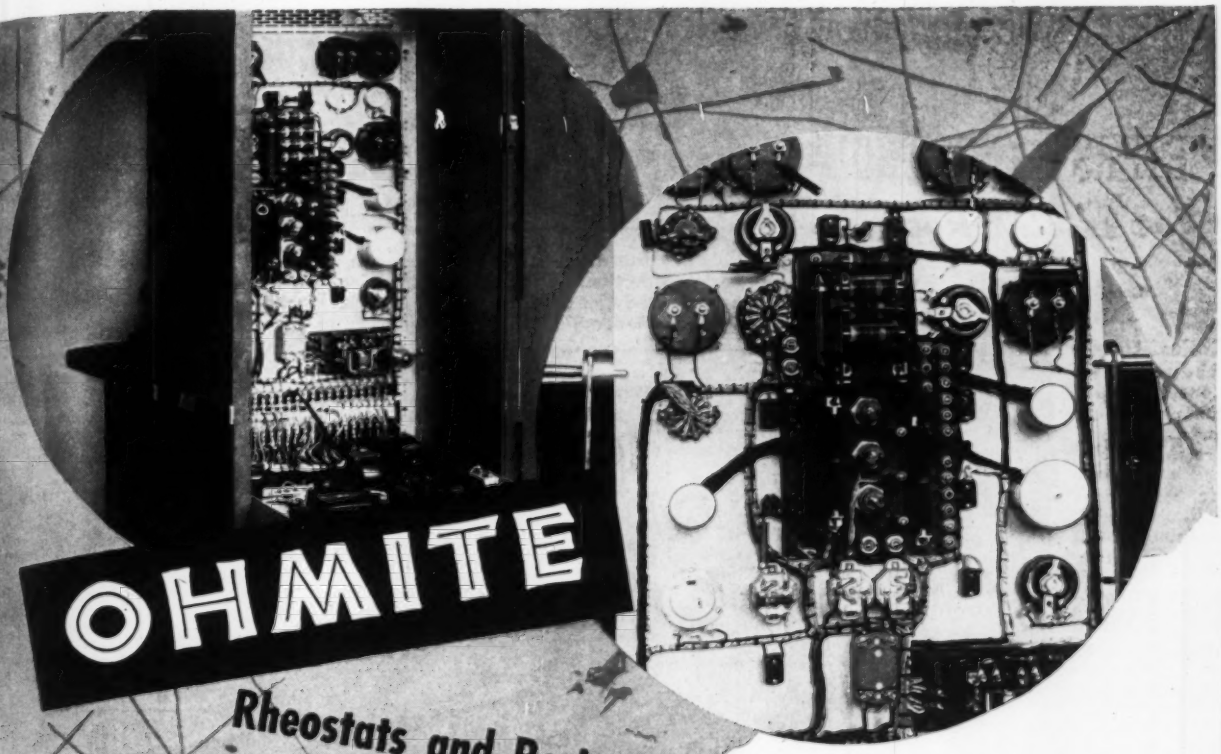
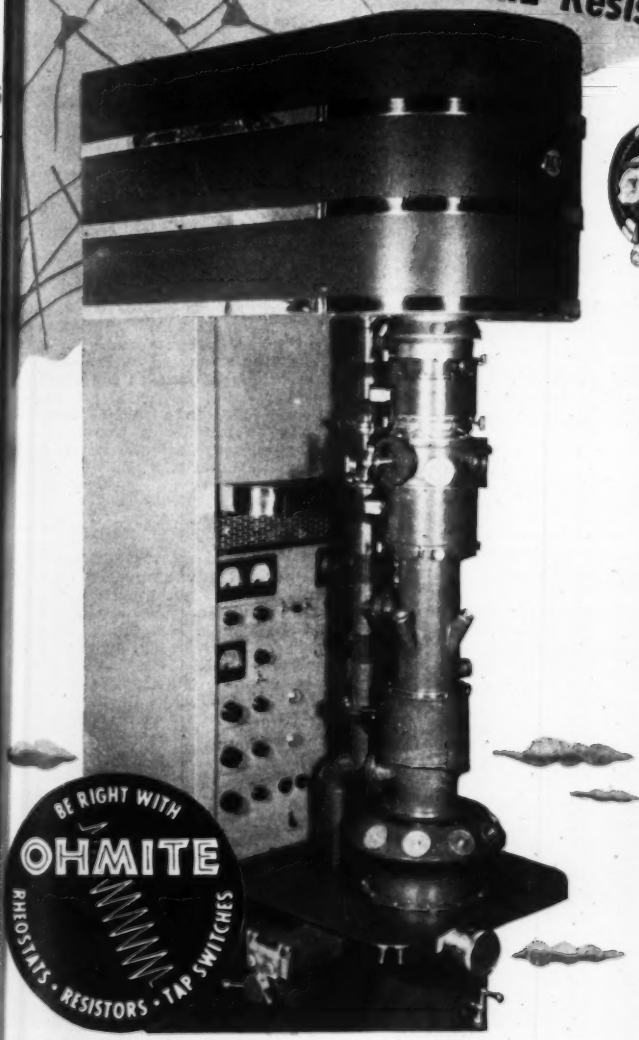


OHMITE

Rheostats and Resistors Used in Electron Microscope



This amazing electron microscope, developed in the RCA Laboratories, explores new sub-microscopic worlds not revealed by light waves. It is from 50 to 100 times more powerful than the strongest optical microscope. Magnifications up to 100,000 diameters are obtainable.

The use of Ohmite Rheostats and Resistors in the circuits of such an advanced electronic instrument is a tribute to their quality and performance.

Ohmite Products are used today for accurate, dependable control-by-resistance in many electronic and electrical devices... in laboratory apparatus, in fighting equipment, in scientific instruments, and in the production tools of war. These resistance units will be ready to serve the new electronic age to come... after Victory is won. Ohmite engineers are glad to work with you on any control problem.

Send for Catalog and Engineering Manual No. 40

Write on company letterhead for helpful 96-page guide in the selection and application of rheostats, resistors, tap switches, chokes and attenuators.

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METERS and CONTROL *for Boiler Room Service . . .*

Boiler Meters Reduce fuel costs, lessen maintenance and outage, lower standby costs, and add capacity. They indicate, record and integrate Steam Flow from the boiler, record Air Flow supplied for combustion and record Flue Gas Temperature.

Bailey Boiler Meter

Multi-Pointer Gages for indicating drafts, pressures, differentials are available with any number of pointers from one to twelve. They are actuated by sturdy yet sensitive diaphragm units.

Multi-Pointer Gage

Flow Meters. For indicating, recording and integrating the flow of steam, feed water, compressed air and other fluids.

Coal Meter

Granular Material Meters For accurately measuring the flow of coal or other granular materials in gravity chutes from overhead bunkers. The total quantity of granular material is shown on a large illuminated counter which may be easily read at a distance of 50 feet.

Control Systems Make possible the everyday operation of equipment for steam generation and utilization at test efficiencies. They are applied to the control of combustion, feed water, superheat, desuperheat and other factors.

Complete Information on any of the above Bailey products will be gladly furnished upon request.

G-14

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The Month's NEW INSTRUMENTS

In this department we strive to report each month ALL the new devices for measurement, inspection, testing, metering and automatic control—in the form of concise technical descriptions. When writing to manufacturers directly, please mention this department. Or write to Information Section, Instruments Publishing Company.

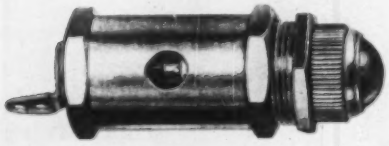
Pressure Switch

New compact pressure switch, designed for controlling pressures in liquids, air or gases, is suitable for operation at pressures

up to approx. 100 lbs. Operation: spring-compensated bellows operates a snap-action beryllium copper switch. New device can be used for either direct or alternating current.—*Vapor Car Heating Co., 80 East Jackson Blvd., Chicago, Ill.*

Pilot Lights

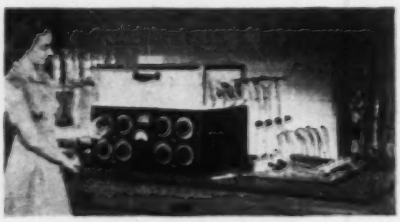
New series of Gothard Pilot Lights is designed for grounded pilot light panels, is said to present noteworthy installation and



maintenance features. Units are approx. 2" long and mount on 1" centers so that a number can be incorporated within a relatively small space. Body hexagons facilitate use of socket wrench in installations that will not work loose. Bulb change is accomplished from front of panel without disturbing body mounting or wiring. Bulb automatically comes out when jewel holder is unscrewed. Bayonet socket lamps (long or round) may be used. Pilot light is well ventilated for cool operation. Available with either faceted or plain jewels.—*Gothard Mfg. Co., 1300 N. Ninth St., Springfield, Ill.*

Combustion Furnace

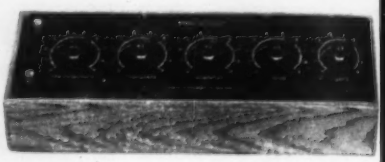
Multiple-unit electrically-heated combustion furnace, although originally designed by Universal Oil Products Co. for determination of carbon on cracking catalysts used for producing high-octane aviation gasoline, is modifiable to handle a wide variety of



organic combustions within temperature limit of 540°C. (1000°F.). Equipment comprises: (1) Oxygen purification system for combustion gases. (2) Oxygen pressure regulating column. (3) Electrically heated furnace 24" long, with four combustion tubes 1" dia. × 30" long. Heating intensity for each half of each tube is independently controlled, and temperature of any tube can be readily observed by means of an indicating pyrometer. (4) Conventional absorption trains with calcium chloride for absorption of moisture and Ascarite for removal of carbon dioxide. Assembly illustrated is merely representative of other multiple assemblies which can be built up to suit the job involved.—*Precision Scientific Co., 1750 N. Springfield Ave., Chicago, Ill.*

Decade Box

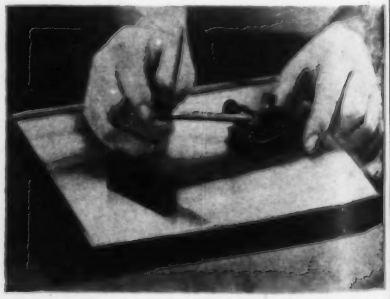
New "Model 5" is announced as a precise decade box providing a choice of any resistance from 1 ohm to 99,999 ohms in steps of 1 ohm. All decades are adjusted



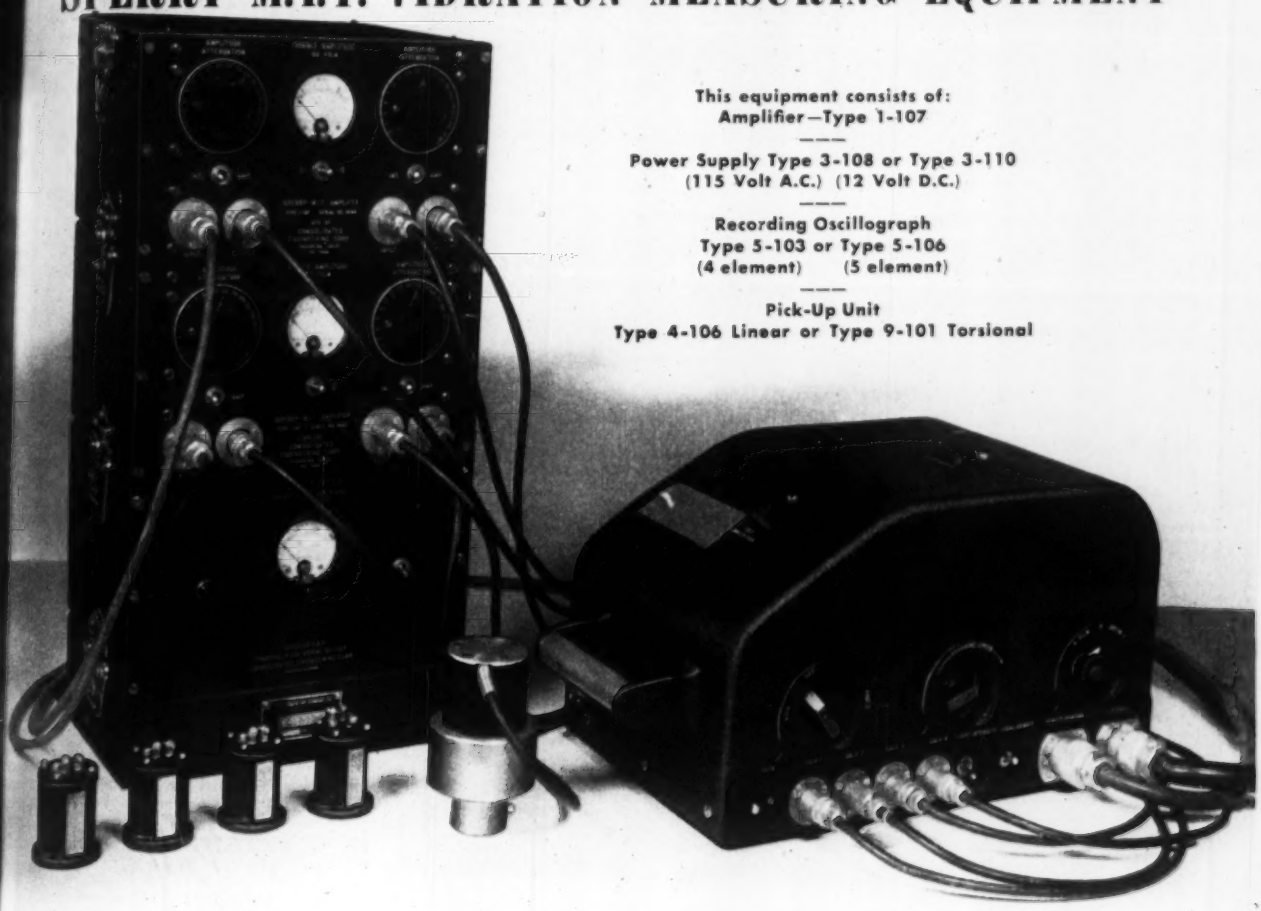
to an accuracy of 1/10th of 1% and all resistors are non-inductively wound with wire which has a temperature coefficient of ±0.00002 between 20° and 100°. Low resistance switches are used throughout. The Bakelite panel is engraved by the new "fill in" process which eliminates the possibility of letters ever being scratched off. The instrument is housed in a rugged oak cabinet. Delivery on priority of AA-3 or better 15 days.—*Superior Instruments Co., 227 Fulton St., New York 7, N. Y.*

Glass Surface Plates

Recently perfected surface plates are said to present several advantages by reason of their being made of solid plate glass with a low temperature coefficient of expansion (4.45×10^{-6} per deg. F.). They are available in accuracies of 20, 30, 40 and 50 millionths of an inch. Users save time in the use of these Cadillac Glass plates by having etched on the under side, desirable details and data. Glass, as it wears, shows only



The IMPROVED SPERRY M.I.T. VIBRATION MEASURING EQUIPMENT



This equipment consists of:
Amplifier—Type 1-107

Power Supply Type 3-108 or Type 3-110
(115 Volt A.C.) (12 Volt D.C.)

Recording Oscillograph
Type 5-103 or Type 5-106
(4 element) (5 element)

Pick-Up Unit
Type 4-106 Linear or Type 9-101 Torsional

USES

For years this Sperry M.I.T. Vibration Measuring Equipment has been the accepted standard for measuring linear and torsional vibrations with self-generating type of pick ups. The improved design makes it more convenient for either ground vibration studies or flight tests. It is particularly valuable for both torsional and linear engine vibration studies.

THIS equipment has been redesigned to reduce size and weight. The circuits have been changed to give improved stability of operation and all units are completely interchangeable with any existing Sperry M.I.T. equipment.

Two amplifier channels are now in the same case where one was formerly. Either linear or integrating circuits may be used. Four amplifier channels are now supplied from one power supply. The amplifier output is designed to match the Sperry M.I.T. Oscillograph. Write for descriptive booklet!

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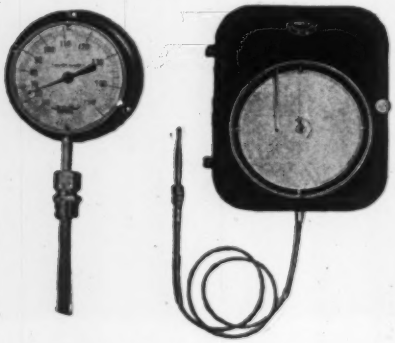
Production or Research Instruments

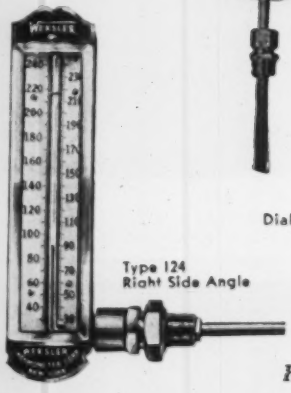
Weksler Thermometers are scientific, precision instruments. Their rugged construction and lasting accuracy will merit your full confidence. Red Reading and Yellow back Mercury tubes are standard in all V shape industrial thermometers. Indicating and recording thermometers are furnished mercury, vapor, or gas actuated. Dial indicating instruments are available in 4½", 6", and 8½" phenol condensate cases, and recording thermometers in 10" chart size. There is a Weksler precision thermometer for every industrial need.

"V" Shaped Bronze Case Industrial

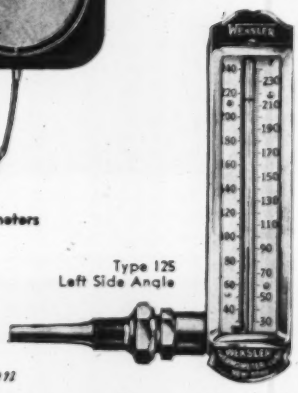
Thermometers and Hydrometers



Dial and Recording Thermometers



Type 124 Right Side Angle



Type 125 Left Side Angle

For information on

Dial and Recording Thermometers, send for Catalog 300 DR

For others, send for Catalog No. 115.

Weksler Thermometer Corporation

52-56 WEST HOUSTON STREET, NEW YORK, N. Y.

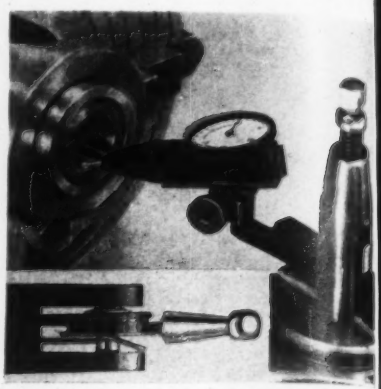
scratches which neither burr nor affect accuracy unless densely grouped. Re-surfacing is said to be unnecessary. Demagnetizing is obviously unnecessary. There being no corrosion problem; oiling routines are unnecessary. Accuracy can be checked with ease. Cost is said to be "probably less than re-surfacing a scraped steel plate." Several sizes are available for prompt delivery in individual wooden boxes with protective-cover tops.—*Cadillac Glass Co., 900 West Cermak Rd., Chicago, Ill.*

Dynamic Balancing Machine

New "Model 400" added to maker's line of "Dy-Namic" balancing machines has a maximum swing capacity of 84"; maximum weight capacity of 4000 lbs. and when using one set of flexing heads will accommodate a minimum of 500 lbs. Available for this machine are lighter flexing heads which reduce the maximum and minimum capacity. A feature of this machine is that it will accommodate an arbor range in diameters up to 9", at bearing points. Machine is equipped with a multiple-speed motor. Its overall width is 36"; overall height 56"; standard bed length of 7' 6". When using a 7' 6" bed, the overall length is 10' 6". Bed lengths up to 11' 6" are available. This machine is available with either "Type R" or "Type B" heavy-duty heads. It embodies the principle utilized in the smaller models of the maker's balancing machines (see *Instruments*, Oct. 1942, page 430). It is equipped with a self-energizing brake. Flexing heads and the driving sheave are mounted on ball bearings for smooth operation and continuous service. Support columns move along bed by means of hand wheels. Machine is equipped with multiple v-belt drive. Despite its larger capacity, sensitivity of indicating mechanism has not been sacrificed. Spark indicating dial is so designed that it can be read from either column.—*Bear Mfg. Co., Rock Island, Ill.*

Dial Indicator

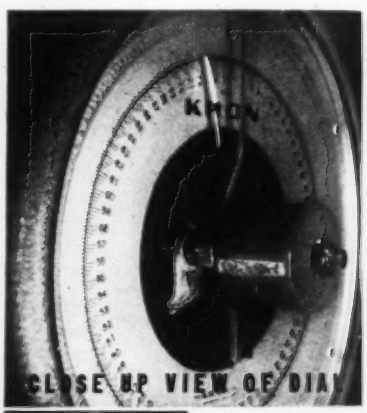
New "Testmaster" Universal dial indicator has all features of previous models (see *Instruments*, July 1937, page 271).



Principal new feature is a new ratchet index point which locks in place and will not come out unless taken out (see enlarged detail in illustration).—*Federal Products Corp., 1144 Eddy St., Providence, R. I.*

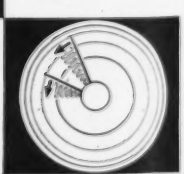
Magnetic Clutch Scale

New "Electro-Magnetic Clutch Scale," in addition to the usual weight indicating pointer, is equipped with a longer secondary pointer which is brought into operation by an electromagnetic clutch actuated by an interval timer, by a remote toggle switch, photocell or other control element. New clutch can be applied to all styles of maker's industrial dial scales and precision force measurement instruments. New scales will be used in engine test cells to indicate by direct dial reading the rate-of-flow in pounds per hour, the fuel or lubricating oil

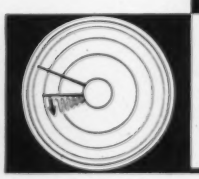


CLOSE UP VIEW OF DIAL

"Magna-Pointer" held at zero before timing interval.



"Magna-Pointer" engages and moves with weigh pointer during interval.

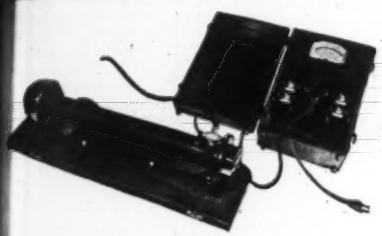


"Magna-Pointer" instantly stalls at end of timed interval.

…ng used by aircraft engines at various …eds. New electromagnetic clutch pointer …s many uses when applied to force …asurement instruments. For instance, in a …ing testing instrument it provides means …instantly arresting the magnetic pointer …icating the pressure existing when the …ing is compressed by a predetermined …eal amount or percentage. For gravi…tric flow rate tests, charts are calibrated … 60 times weight indicated in one-min… flow interval, giving direct readings in …unds per hour; or to give pounds-per-…inute readings; or to give readings in …y other units.—*The Kron Co., Bridgeport …Conn.*

Photoelectric Smoke Meter

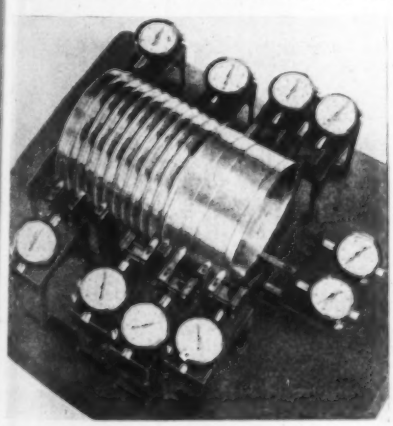
Design of new "Photovolt Photoelectric …oke Meter" is based on smoke meter de…loped in Diesel Laboratory of Pennsyl…nia State College and described by Prof.



…H. Schweitzer in *Instruments*, September …942. A few features have been added to …ake instrument more widely applicable. …However, basic principle has been retained, …articularly as regards approx. length of …be and definition of "smoke density per…ent." Meter is being considered for adop…ion as standard instrument by the Co…perative Fuel Research Committee. Meter …s designed to furnish an objective indica…ion of density of smoke, independently of …ndividual judgment and of light conditions. …Developed originally for testing smoke of …Diesel engines, it is not restricted to this …pplication but will be found equally useful …n conjunction with other internal combus…ion engines as well as with furnaces and …wherever the light-obstructing properties of …suspended particles in a gas are to be de…ermined. It requires no installation except …or a tube connection leading from exhaust …pipe of motor or from flue of furnace to …nlet of instrument. Equipment comprises …two units in portable (15-lb. and 17-lb.) …housings which can be carried by one per…on. It can be operated from a 105-125-volt …50-60-cycle a-c. power line or from a stor…age battery. Standard models for engines …and furnaces are indicating; special models …can be furnished with recording instru…ments, audible alarms or visible signals, …etc.—*Photovolt Corp., 95 Madison Ave., New …York City.*

Diameter and Length Gage

New "Model 247 B-72" is designed to …check simultaneously ten dimensions on …cylindrical sleeves—eight diameters and two …lengths. Indicators on either side of the



STROMBERG *Automatic* TIMERS

for EVERY INDUSTRIAL NEED

No. 55 Process Timer

Stop waste . . . Substitute mechanical precision for guesswork . . . Save precious material and man hours . . . Improve quality and increase production with reliable, **automatic** Stromberg Timing Instruments.

Ruggedly constructed for heavy service. Sealed to exclude dust and moisture. Not affected by temperature changes. Easily set for any time interval within the dial range. Makes or breaks an electrical contact at the end of each cycle. A glance tells the interval set, the time elapsed and time yet to run. During operation, the time interval cannot be altered. Dial ranges are available to fit any application.

The No. 55 Process Timer runs for the time interval set, makes and holds a contact until it is reset and restarted.

The No. 57 Automatic Repeating Timer makes a contact at the end of the interval set, automatically returns to zero and begins a new cycle—repeating this program until stopped or changed.

Use Stromberg Timers to ring signal bells, light signal lamps, start and stop electric motors, reverse drafts, open and close valves. Thousands are in use today in steel plants, tool industries, rubber processing plants and in baking, preserving, tanning, enameling, plating and heat treating processes.

Write us for complete information. Our engineers will be glad to study your problem and make recommendations without obligation to you.

No. 57 Automatic Repeating Timer

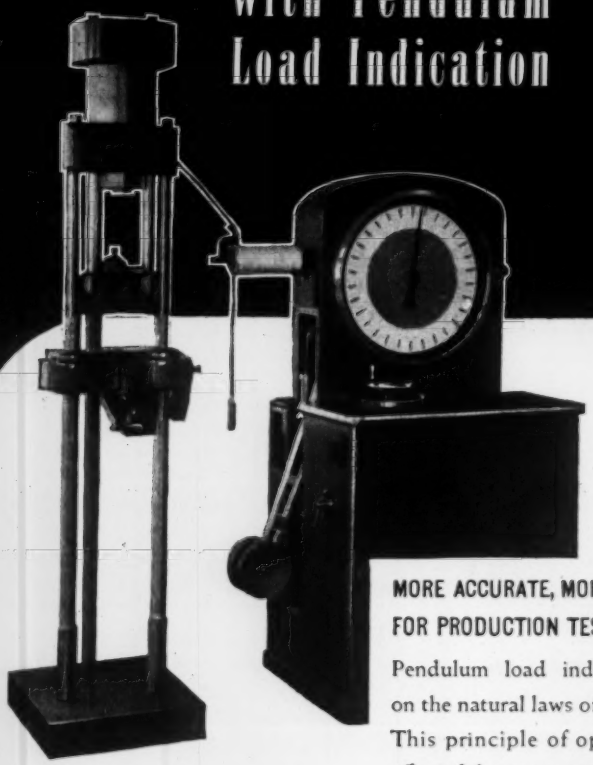
STROMBERG TIME CORPORATION

SUBSIDIARY OF GENERAL TIME INSTRUMENTS CORPORATION

109 LAFAYETTE STREET NEW YORK, N. Y.

PRECISION HYDRAULIC TESTING MACHINE

with Pendulum Load Indication



MORE ACCURATE, MORE DEPENDABLE FOR PRODUCTION TESTING BECAUSE:

Pendulum load indicator operates on the natural laws of gravitation.... This principle of operation is not affected by temperature changes or subject to metal fatigue. . . . *Write for descriptive literature and quotations.*

ARMY E NAVY

RIEHLE TESTING MACHINES

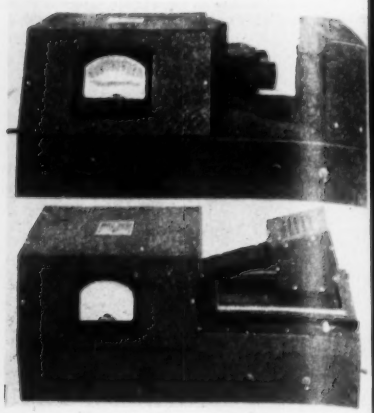
Division of
American Machine and Metals, Inc., East Moline, Illinois

Other Products: IMPACT TESTERS · VICKERS HARDNESS MACHINES
BRINNELL HARDNESS TESTERS · MEASURING INSTRUMENTS

workpiece check the various diameters; two indicators at the end check lengths: one checks entire length and the other checks length from flange to left-hand end. Each indicator is an individual unit and its action in no way depends on any other unit. Cylindrical sleeve is positioned by placing it on V-shaped locating contacts; left-hand end of sleeve against the end stop. Each unit checking a diameter consists of a dial indicator, a sensitive contact whose movement is transfe?red directly to the indicator point by means of a pantograph unit, and a fixed contact, all assembled and mounted on flat springs which allow transverse movement of unit as a whole. Pantograph unit permits many checks to be made which would otherwise be impossible with the ordinary indicator points; also makes possible a convenient means for setting the gage to a master. The fixed contacts also can be adjusted when necessary.—*Federal Products Corp., 1144 Eddy St., Providence, R. I.*

Photoe'ectric Densitometer

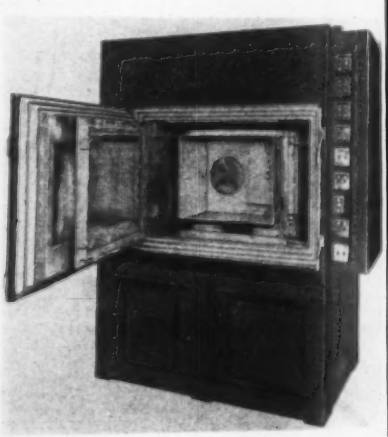
New "Densitometer Series D90" was developed originally for use in manufacture of extremely dense optical filters, to maintain accurate control of transparency during large quantity runs, but is suitable for constant density control of films and plastics, for turbidity control of liquids in various processes such as manufacture of aluminum, and for turbidity control of gases "wherever extreme accuracy is desired." New instrument projects two beams of light from a single light source. One beam passes through any standard filter; the other, through the filter or cell containing sample to be measured; both beams are then projected to a single phototube. By means of an electronic and mechanical timing system, densitometer constantly measures ratio of transparency of sample to that of standard filter. As the same source of light and



the same phototube and amplifying syste are used to examine both standard an sample, resulting measurements are said t be extremely accurate and completely in dependent of circuit constants, supply volt age and other ambient conditions. Varia tions of ±10 volts from standard have n effect on readings. Densitometer is supplie to meet individual transparency specifica tions and production control requirements Series D90 measures materials up to densit 5. For recommendations on a particular ap plication, information is required as t range of density or percent transmission o material to be measured, as well as a sketch indicating manner in which mate rial is to be passed through light beam.— *Photoswitch, Inc., 77 Broadway, Cambridge Mass.*

High-altitude Test Chamber

Advanced model of high-altitude test cabinet (preceding models, *Instruments*, Sept. 1942, page 385; July 1943, page 458) consists of a vapor-proof automatic mechanical refrigeration cabinet and an enclosed vacuum chamber with air space completely surrounding it. Above vacuum chamber a coil of sufficient size is mounted to take care of complete pull-down including mass load, heat leakage, etc., of the cabinet itself. Thus, ambient temperature of altitude chamber will be as low as is necessary for testing within the chamber. In addition interior of altitude chamber is equipped



with a coil and a forced air unit so that any heat dissipation from motors, etc., may be carried away in the refrigerating system rather than by heat transfer through wall. Innovation is the "Floating Glass Seal." A heavy glass is mounted on the main refrigerator cabinet door, pivoted at center and floating on spring bolts to maintain perfect alignment upon closing and to give freely under vacuum pressure. Seal to vacuum chamber is made at the time the refrigerator door is latched. Interior of vacuum chamber can be dehydrated with the overhead coil and then sealed previous to pre-heating for obtaining low relative humidities. Another feature of this "Ameoil

...it is that any changes in test procedure ...quiring holes, shafts, electrical leads, etc., ...ecting construction of vacuum chamber, ...n be made without disturbing refrigera... ...n equipment. Chamber can be removed ...act, revamped or changed, and then re... ...erted in cabinet without extensive re... ...irs. Unit illustrated is "Model RAC-11." ...terior overall measurements are 72½" ...de × 101½" high × 49" deep, including ...and. Height of cabinet is 66½". Switch ...nel extension is 12". Interior (usable ...ace) is 30" wide × 24" high × 18" deep; ...ntents, 8 cu. ft. (Model RAC-22 is 44" ...de and has 11 cu. ft. of usable interior). ...mperature range is −70°C or −55°C, to ...70°C. Pressure, from atmospheric to ...,000 feet.—*American Coils Co., 27 Lex...gton St., Newark, N. J.*

Vibrating-reed Frequency Meter

New vibrating-reed frequency meter is of ...ntirely new design, utilizes a new operat...g principle, is available in round-case ...odels for panel mounting and in multi...nge portable rectangular model. As shown ...Fig. 1, it consists of a case (1), base

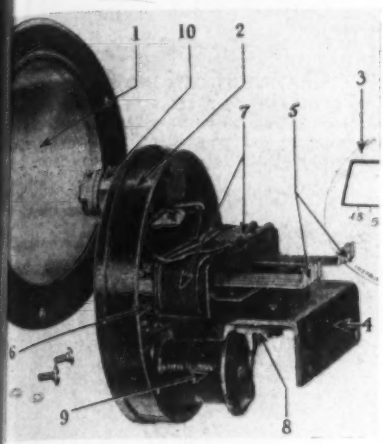


Fig. 1

(2), dial (3), central mounting frame (4), ...a series of spring steel reeds (5) screwed ...to a reed mounting bar (6), an individual ...driving coil (7) surrounding each bank of ...reeds, a permanent magnet (8), a series ...resistor (9), and terminal studs (10). Reed ...assemblies are fastened to reed mounting ...bar after first being adjusted to resonance ...as individual units. A temperature and ...over-voltage run is made on all assemblies ...before shipment. Spacing between reeds is ...set to provide desired broadness of response ...for particular application. For most appli...cations, spacing is such that with a sine ...wave voltage of 60 cycles (for example) ...the 60-cycle reed will vibrate at maximum ...amplitude and the 59-cycle and 61-cycle ...reeds will vibrate at one-quarter of maxi...mum amplitude. *Operation* is based on two

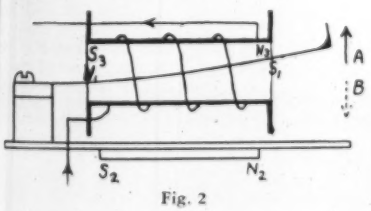


Fig. 2

effects: (1) a.c. in driving coil causes reed ...to be alternately attracted to and repelled ...by permanent magnet under coil; (2) ...polarized reed is alternately attracted to ...and repelled by the winding surface of the ...coil in phase with the first effect, as shown ...in Fig. 2; and is also stressed by the at...traction of the induced poles N_1S_1 to the ...magnet poles N_2S_2. These two effects oper...ate on all reeds but energy available is ...only sufficient to drive reeds which have ...natural mechanical resonance at or near

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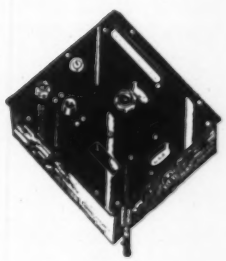
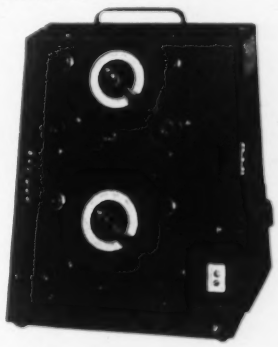


Coleman Universal Spectrophotometer Model 11 selects a monochromatic light band 35 mu wide, anywhere from 300-800 mu, with better than 2 mu precision. It passes light bands of any hue, including invisible bands at end of the spectrum, through any translucent product. Operation is simple.



Coleman Anoxia Photometers, used in aviation, oxygen therapy, and anesthesia, employ Luxtron cells in a diminutive photometer which clamps on subject's ear, projects light through membrane, then measures spectral characteristics of emergent beam, directly indicating degree of anoxemia. Models A (above) and 17, for aviation and clinical uses.

For complete literature on Coleman instruments, write: Coleman Electric Co., 415 Lexington Ave., New York City, or 310 Madison St., Maywood, Illinois.

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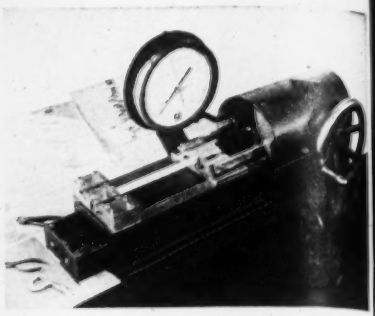
Fig. 3

supply-voltage frequency. Design is said to possess all advantages of the vibrating-reed class of frequency meters, such as freedom from wave-form error, independence of line voltage variations over wide range, etc., plus high sensitivity, compactness permitting use of small cases and various desirable groupings, and simplicity permitting maximum production with minimum special parts. *Accuracy:* instruments with full-cycle increments, ±0.3% of reading; half-cycle, ±0.2%. Temperature coefficient is approx. 0.008% per degree Fahrenheit, reading decreasing with increasing temperature. Power consumption is approx. 1 watt at 115 volts for the 60-cycle 100-150-volt instrument. Specials are available for as low as 8 volts or above 500 volts. Frequency ranges can be set in combinations from 15 to 425 c.p.s. Round-case models are available in standard 2½", 3¼" and 4¾" flange diameter cases.—*J-B-T Instruments, Inc., 441-J Chapel St., New Haven, Conn.*

Tensile Tester for Plywoods

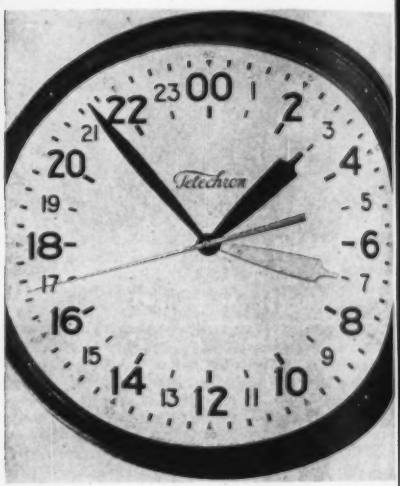
Developed especially for plywoods and veneers, new tensile tester is self-contained, uses flat specimens requiring no special preparation. Specimens are clipped from



veneer or sawn from thin plywood, in rectangles 1" wide and 8" or more in length, thickness from a few thousandths to 5/16". Test is completed in about one minute.—*Streeter-Amet Co., 4101 Ravenswood Ave., Chicago, Ill.*

Communications Clock

To facilitate interpretation of time in connection with communications and travel problems to every part of the world, new "communications clock" includes, in addi-



tion to the conventional minute hand and sweep-second hand, a special dial divided into 24 sections instead of conventional 12 sections, a 24-hour movement and two 24-hour hour hands. These latter, finished black and red respectively and with convenient means for setting with regard to each other, indicate local time and Greenwich (zero Meridian) time respectively. The 24-hour operating cycle of the hour hands and the dial character layout permit direct reading of time, on a 24-hour basis, eliminating the A.M. and P.M. complications. New clock is built to maker's precision standards, is supplied in 15" dial for wall mounting, and operates directly from the regulated-frequency a-c. supply.—*Warren Telechron Co., Ashland, Mass.*

Spring Tester

New instrument for testing compression springs in sizes to 2½" diameter and 7" in length, makes it possible to rapidly measure the recoil pressure of a spring when compressed to any predetermined length, also to accurately match sets of springs (as valve springs for internal combustion engines). In design and principle, Sturtevant Spring Tester is said to differ radically from previous spring testers in the following ways: First, it is operated with any accurate standard torque wrench, which serves as the operating lever and provides

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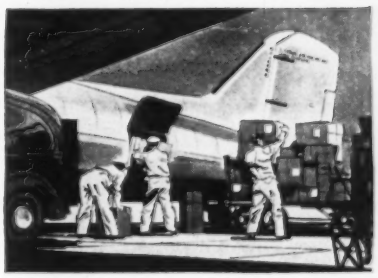

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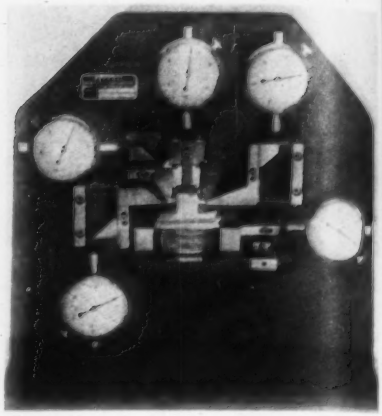
the measuring element. Second, in this tester a sound device is used to indicate when the spring has been compressed to the test point, thus obviating the need for the operator watching multiple dials. Third, compression of spring is against a rigid platform to prevent accumulated errors in reading. Fourth, being a lever-operated, quick action device that bolts to any bench and being extremely inexpensive, it permits general distribution to logical test, check-up and inspection points throughout a plant. Tester is said to be so engineered and compensated that it is in itself inherently accurate and hence test readings will be as accurate as the Torque Wrench used. Operation of Sturtevant Spring Tester is simple: It can be adjusted for any test by adjusting height of test platform to match length at which the spring is to be tested. This platform is mounted on a threaded column and is raised or lowered by revolving. A milled flat on the column carries a stamped scale calibrated to sixteenths of an inch. Adjustments to 1/16" of platform height for test lengths can be read directly on this scale. For finer adjustments, one quarter turn of the platform raises or lowers it 1/64"—surface of platform being marked for readings of 1/64", 1/32" and 3/64". For even finer adjustments periphery of platform is divided into 21 ridges: these permit adjustments of test lengths to 0.003". With platform at desired position and a torque wrench attached by inserting drive square of wrench into female square of compressing tongue, springs are tested by just placing them on platform and pulling down on wrench. This causes tongue to compress spring against platform. Operator watches dial on torque wrench. When point is reached at which recoil pressure of spring is to be measured, the tone device sounds and the operator takes his reading from the scale (or dial) on the torque wrench.—*P. A. Sturtevant Co., Addison, Ill.*

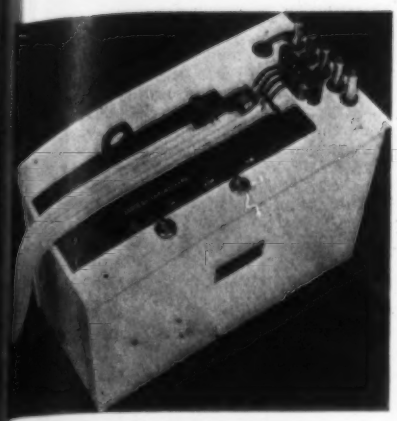
Thickness, Height and Distance Gage

New "Model 247 B-76" is designed to check, in one operation, five entirely separate dimensions on a part such as a fuze body. It stands upright so that dials face operator seated at bench. This gage first must be set to a master. Fuze body is positioned accurately in gage by placing it on three supporting blocks in such a position that the narrow shoulder on under side of body contacts front surface of rear block. Also, side of tang must contact two fixed locators. Dials can now be read. Movement of each sensitive contact is transmitted directly to each dial indicator point through a pantograph unit. This feature prevents the dial indicator points from becoming worn or otherwise damaged by constant contact with the pieces being gaged.—*Federal Products Corp., 1144 Eddy St., Providence, R. I.*



Portable Kelvin Bridge

New "No. 1622" portable Kelvin bridge has been developed for uses requiring neither the exceptionally high accuracy nor the extremely low range of maker's "High Precision Kelvin Bridge." New instrument is compact, including in one case a variable resistance standard, a variable double ratio, a built-in "Pointerlite" galvanometer of exceptional sensitivity, self-contained batteries for furnishing bridge current and current for the galvanometer lamp, switches for convenient connection of external galvanometer and battery, and a two-circuit key arranged to control battery and galvanometer circuits in proper sequence to eliminate or minimize transient galvanometer deflection otherwise experienced in measurement of reactive resistances. Variable standard of resistance includes nine fixed resistance sections of 0.01 ohm each connected in series with a continuously variable resistance standard of 0.011 ohm arranged in circular form. Potential contacts are arranged so that any fraction of resistance standard may be included in potential circuit. Variable resistance standard may be adjusted and read by estimation to



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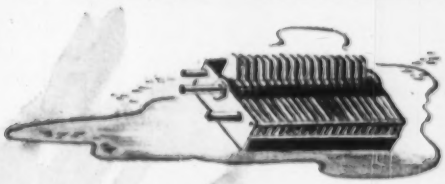

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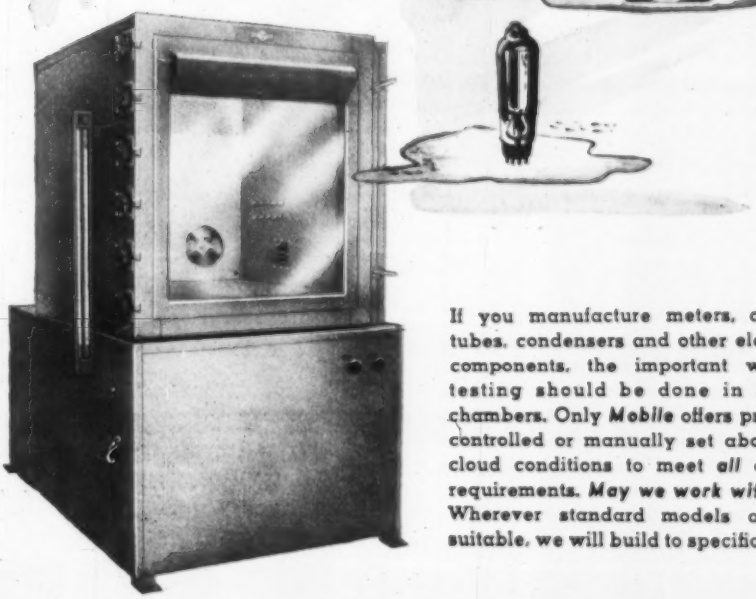

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Fig. 1

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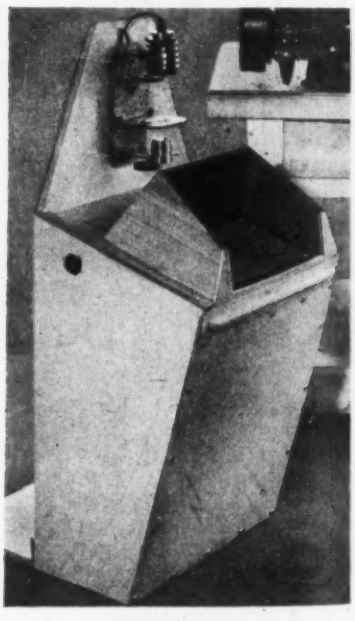
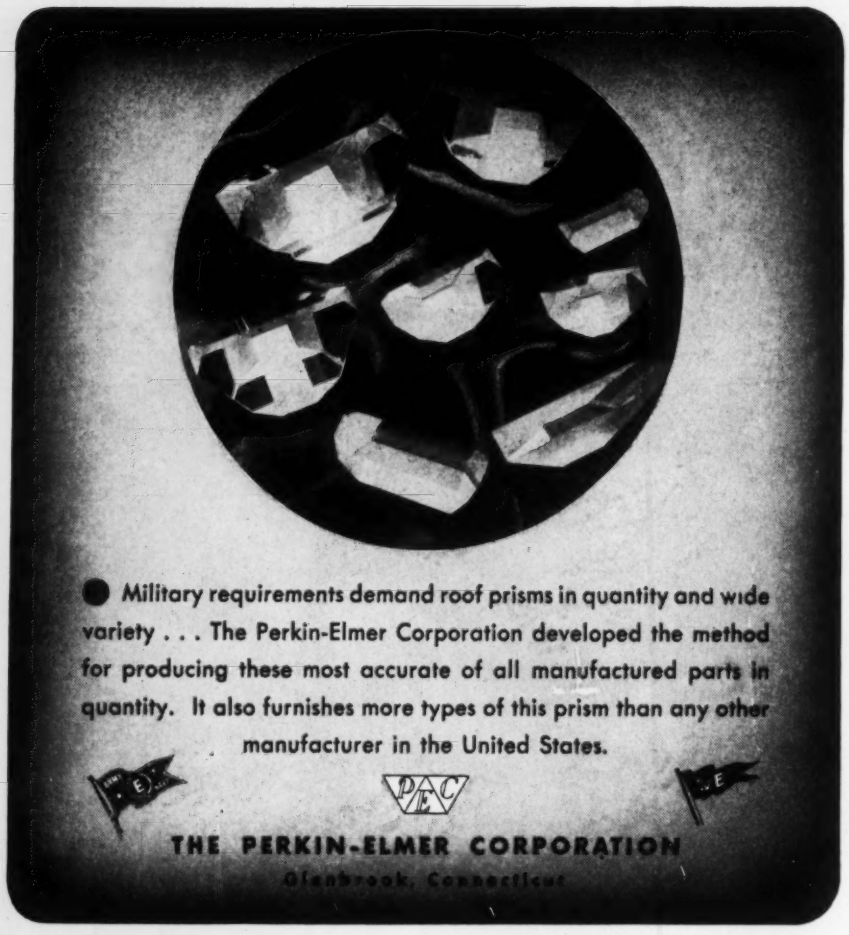


Fig. 2

ment, produces a definite magnification of 24×. Other magnifications can be supplied as special equipment. Image is undistorted and contour is free from color fringes. Image appears on a 9" × 15" ground glass screen, on which is placed a sketch of the standard. A slight adjustment of the centering device aligns image and drawing. All operations can be carried on in any room under normal illumination. Comparator can be used in horizontal or vertical position as required by the work. For use in horizontal position, instrument is placed on any convenient work table (see Fig. 1). The oper-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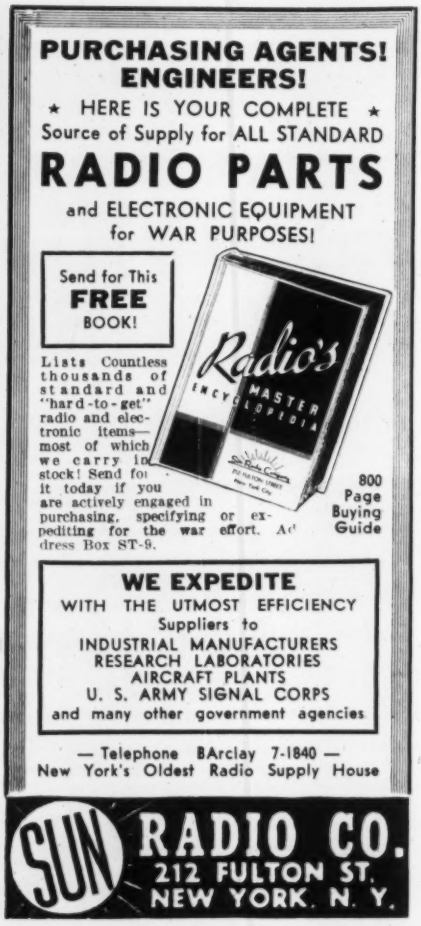
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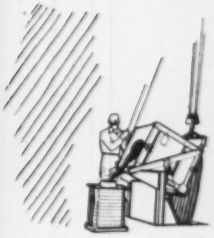

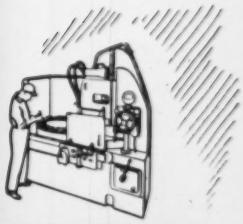

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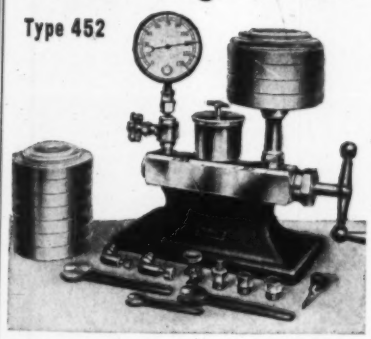
Type 452



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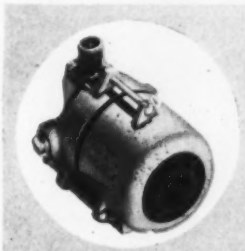

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When the soldiers and sailors of World War II return to civilian life they will bring with them a new respect for the importance and value of precise instrumentation. The same will be true of the legions of women who presently are mastering the intricacies of industrial mechanics.

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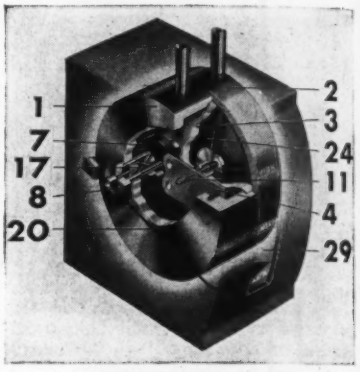
ator can be seated directly in front of the screen with all necessary materials within arm's reach. Part to be examined is placed on the optical bench, with or without the use of a holder as required. This position is best adapted to inspecting operations. In the vertical position (see Fig. 2) the specimen for examination is placed on a glass disc fixed in the path of the light beam. This method is generally recommended for comparisons to be made on work while in progress and the instrument is located near the work bench. Dimensions, 16½" × 17½" × 40" long. Current for lamp, 110-115 volts a.c.—*Fish-Schurman Corp., 230 East 45th St., New York City.*

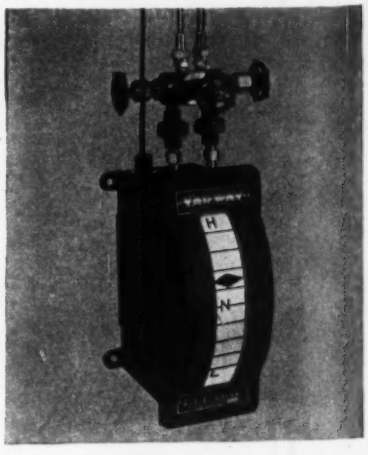
Remote Water-level Indicator

New indicator, wall- or panel-mounted at eye level, shows level of water in boiler drum, is operated by difference in pressure in connecting tubes (which is difference in



Working Mechanism of Remote Water Level Indicator
1. Cover, 2. Housing, 3. Backing Plate, 4. Deflection Plate, 7. Permanent Magnet, 8. Tubular Well, 11. Pin Point, 17. Spiral Armature, 20. Pointer, 24. Neoprene Diaphragm, 29. Illuminated Scale.

head between fixed water level in upper pressure pot and varying water level in boiler drum). Pressure differential acts on Neoprene diaphragm 24 (see cutaway view) and pin 11 transmits net diaphragm force



to spring-metal deflection plate 4, moving permanent magnet 7 along bronze alloy tubular well 8 containing spiral armature 17 of magnetic material. Thus rotation of armature, and corresponding greatly-magnified motion of pointer 20, is in direct proportion to movement of diaphragm. Magnetic coupling permits complete separation of pressure parts from nonpressure parts without stuffing boxes. Thus magnet and deflection plate are in pressure chamber, whereas jewel-bearing armature in tubular well operates freely without packing and

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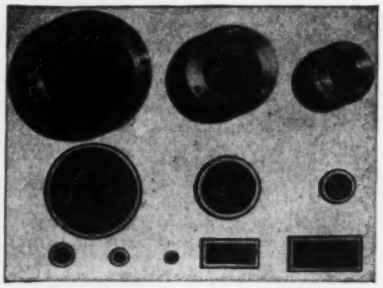

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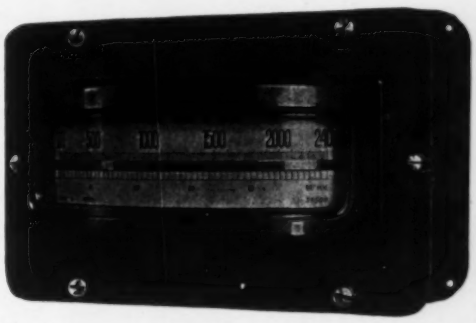

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ARMY E NAVY

9-CC-2

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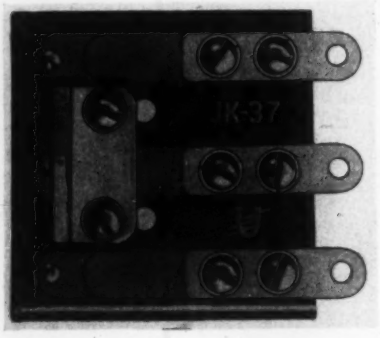
at atmospheric pressure. Magnet and spiral armature are said to be equivalent to a worm wheel driving a steep-pitch worm except that normal tooth friction between wheel and worm is eliminated. Balanced black pointer 20, attached to armature and revolving with it, indicates changes in boiler water level on illuminated scale 29 that shows green for normal operating range and red at high and low levels. Adjusting screw changes scale range by shifting fulcrum of deflecting plate. Another adjusts instrument zero. Two models serve all boiler pressures up to 1500 lbs./in.^{2}.—*Yarnall-Waring Co., 102 E. Mermaid Ave., Chestnut Hill, Philadelphia, Pa.*

Heavy-duty Jack

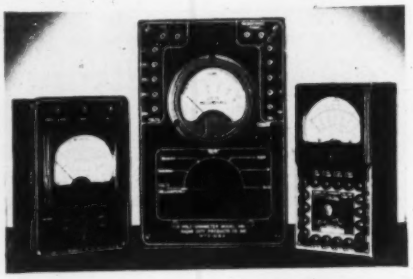
New No. "JK-37" heavy-duty three-contact jack has a large coin silver contact on each of the two leaf type contact blades.



Terminal tabs are hot tin dipped. Body is molded from high-impact-strength phenolic material. Side brackets allow for panel mounting. Overall depth 2 5/16".—*Universal Microphone Co., Inglewood, Calif.*

Three Re-designed Testers

(1) POCKET-SIZE MULTIMETER.—New "Model 442" is a compact multitester with a 200-microamp. movement and a sensitivity of 5000 ohms per volt. Four d-c.



milliammeter ranges: 0-0.3/6/30/150 (with a first scale division of 5 microamperes). Four d-c. voltmeter ranges: 0-6/150/300/1500 (with a first scale division of 0.1 volt). Four a-c. voltmeter ranges: 0-6/30/150/600 (with a first scale division of 0.1 volt). Four output voltmeter ranges: 0-6/30/60/150/600. Four decibel ranges from −6 to +50 db. (2) OUTPUT METER.—New "Model 471," an output meter with a constant impedance of 4000 ohms. All resistors are precision wire wound, and are accurate within 1%. 471 is a rectifier type a-c. voltmeter. Five voltage ranges are available by turning a selector switch: 0-1.5/6/15/60/150. A self-contained condenser for blocking any d.c. components is connected to separate terminals. (3) VOLT-OHMMETER. — New "Model 481," with indicator sensitivity of 50 microamperes, is equipped with precision wire wound resistors accurate to 1%. D-c. voltmeter readings from 0.1 to 1000 volts. D-c. milliammeter readings from 0 to 100 milliamperes. Resistance measurements from 0.1 ohms to 10 megohms. Energy for resistance measurements is supplied from self-contained batteries.—*Radio City Products Co., Inc., 127 West 26 Street, New York City.*

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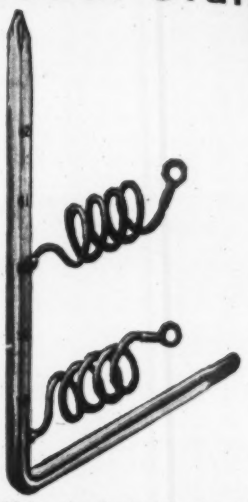

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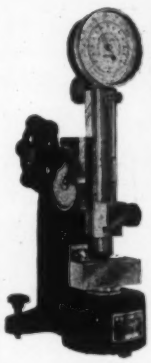

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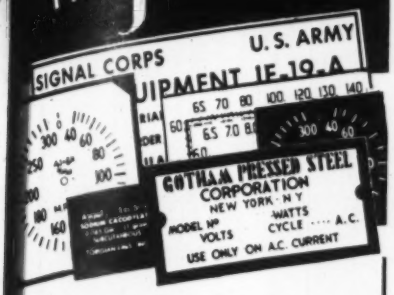

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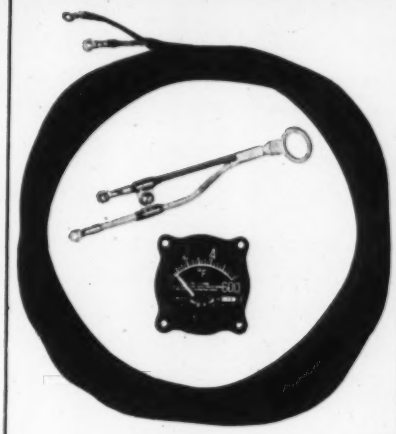

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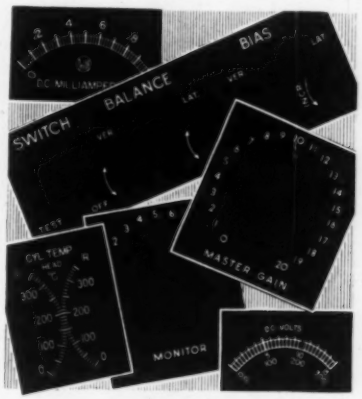

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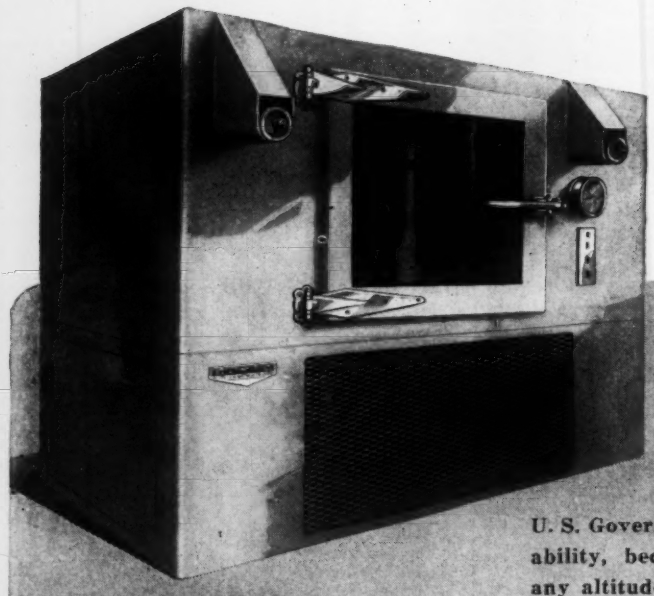

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INSTRUMENT SOCIETY NEWS

NEW YORK

A program of unusual interest has been arranged for the first fall meeting of the New York group on September 28. Professor Carl F. Kayan and Mr. Victor Paschkis of Columbia University will demonstrate "The Application of Electrical Analogy to Temperature Control Problems."

Since this demonstration will entail the use of the University's heat and mass flow analyzer which fills a complete air-conditioned room, the meeting will be held in Columbia's Engineering Building at Broadway and 117th St. at 8:00 o'clock.

Dinner ($1.50) will be at 6:30 at the Men's Faculty Club, 400 W. 117th St. (two blocks east of Broadway). Members, their guests, and all who see this notice, are welcome to attend the dinner and meeting. The 7th Ave. IRT Van Cortland Park Express to 116th St. is the best way to get there.

—BOB FARNHAM

TORONTO

Instruments has received word of the formation of the Canadian Society for Measurement and Control earlier this year. The organization was completed in August and the first officers and committeeman are as follows: *Chairman*, J. M. Langton, Imperial Varnish & Color Co. Ltd.; *Vice-Chairman* J. R. Mott, Canadian Acme Screw & Gear Co. Ltd.; *Secretary*, T. C. Agnew, Minneapolis-Honeywell Reg. Co. Ltd.; *Treasurer* W. S. Mills, Peacock Bros. Ltd. *Executive Council:* E. T. W. Bailey, Steel Co. of Canada, Hamilton; E. W. Bartle, Research Enterprises Ltd., Leaside; K. W. Campbell, Aluminum Co. of Canada Ltd., Long Branch; C. Hartman, John Inglis Co. Ltd.; E. Jones, Lever Bros. Ltd.; A. J. Legault, Bristol Co. of Canada Ltd.; S. Simmonds, Railway Power & Eng. Corp. Ltd.; A. J. T. Sturrock, Teleflex Ltd.

All addresses not given are Toronto.

INSTRUMENT SOCIETIES CALENDAR

City, Society and Secretary			Date	Place	Subject	Speaker
Atlanta	Georgia Society for Measurement & Control	D. D. Beach, P.O. Box 4569, Atlanta, Ga.				
Baltimore	Baltimore Industrial Instrumentation Society	Fred Pullen, Bethlehem Steel Co., Sparrows Point, Md.				
Chicago	Chicago Society for Measurement & Control	Carl Hope, 2626 W. 31st Blvd., Chicago	Oct. 4[B]	Windermere West Hotel, 1642 E. 56	Instruments in the Australian Army	Oswald F. Mingay, Mgr. Radio Division, Australian Ministry of Munitions
			Nov. 1[B]	Windermere West Hotel, 1642 E. 56	Aircraft Engine Testing Instrumentation	To be announced later
			Dec. 6[B]	Windermere West Hotel, 1642 E. 56	Instrument Maintenance in an Oil Refinery	B. A. Hiermeier, Sales Mgr., Brown Inst. Co.
Hartford	Hartford Society for Measurement & Control	Stephen J. Zelle, Whitney Chain & Mfg. Co., Hartford, Conn.				
Newark	New Jersey Society for Measurement & Control	R. F. Robey, 409 Orange Ave., Cranford, N. J.				
New York	New York Society for Measurement & Control	R. K. Farnham, 545 Fifth Ave., N. Y. C.	Sept. 28[B]		See special notice on this page	
N. Indiana	Northern Indiana Soc. Measurement & Control	R. W. Schreiner, 4 Waltham St., Calumet City, Ill.				
Philadelphia	Philadelphia Society for Instrumentation	George Hammer, 712 Otis Bldg., Phila., Pa.				
Pittsburgh	American Society for Measurement & Control	L. M. Susany, c/o Carnegie Institute, 4400 Forbes St., Pgh				
St. Louis	St. Louis Society for Instrumentation	Gus Holubeck, Union Electric Co.				
Toronto	Canadian Society for Measurement & Control	T. C. Agnew, Minneapolis-Honeywell Reg. Co., Toronto				

[A]Meeting at 7:30, no dinner. [B]Dinner at 6:30, meeting at 8. [C]Dinner at 7, meeting at 8. [D]Meeting at 8, no dinner.

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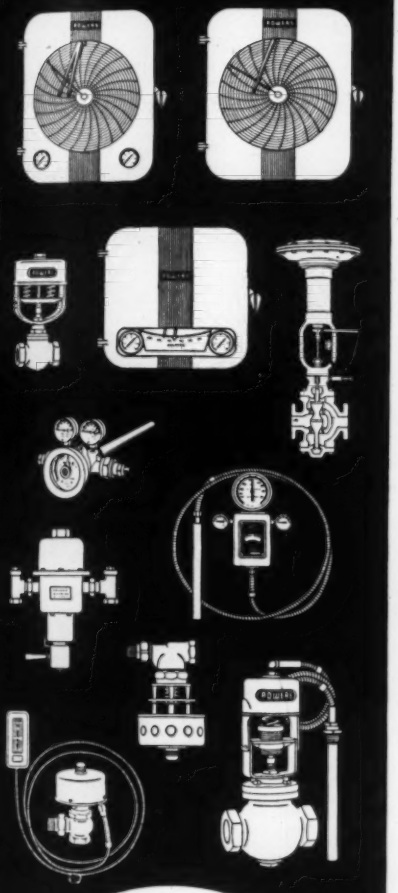
TEMPERATURE and HUMIDITY
CONTROL



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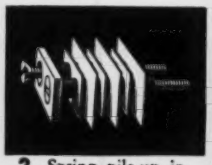

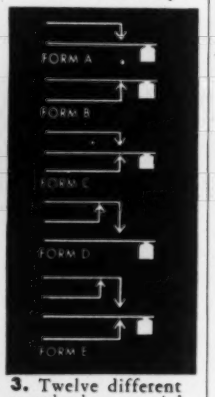

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Manufacturers' New Literature

In this department we report ALL pieces of new literature pertaining to Instrumentation received from the manufacturers. To assist in the War Effort we urge readers to request ONLY those bulletins which will be of value to them. Use the coupon on the facing page.

K-258 **Shop Measurements.** Booklet, 8½" × 11", 12 pages, contains various descriptive charts, illustrations, diagrams and detailed instructions that should go a long way toward simplifying the understanding of light wave measurement. This booklet explains the practical everyday use of light waves in shop measurements. Acme Industrial Company, Dept. I, 200 N. Laflin St., Chicago, Ill.

K-259 **Beyond a Shadow of a Doubt.** Form 431, 11" × 8½", 18 pages, covers the comparison inspection of production parts by optical projection. Parts and products measured and inspected are illustrated. Jones & Lamson Machine Co., Springfield, Vt.

K-260 **Internal Comparator.** Booklet, 8½" × 11", 12 pages, describes the Air-O-Limit gage, a pneumatic device for determining the size, roundness and taper of internal diameters. It lends itself equally well to bench, hand and gun bore gages, and is particularly applicable to relatively inaccessible internal diameter checking. Pratt & Whitney, West Hartford, Conn.

K-261 **Illuminating Magnifiers.** Folder, 8½" × 11", 4 pages, illustrates a number of units having 3 different powers of lenses from 2½" to 8" focal distance, 3" to 8" diameter, with 2½" to 10" observation fields. Surty Mfg. Co., Inc., 4139 W. Kinzie St., Chicago, Ill.

K-262 **The Laboratory** Vol. 14, No. 2 of this house organ has a lead-off story "Science Stretches the Supply of Tin to Meet the Needs of War." Many new laboratory supplies and products are included. Fisher Scientific Co., 717 Forbes St., Pittsburgh, Pa.

K-263 **Some Applications of Instrument Transformers.** Reprint from Electrical Engineering, May 1936. Electrical Facilities Inc., 4224 Holden St., Oakland, Calif.

K-264 **Controls, Switches, Capacitors.** Catalog 24, 8½" × 11", 12 pages, catalogs the above products. Centrolab Division of Globe-Union Inc., 900 E. Keefe Ave., Milwaukee, Wis.

K-265 **Fixture for Testing Sample Plywood Panels in Shear.** Bulletin 1431 M, 8½" × 11", 8 pages, shows the method of assembly and operation, plus test data and explanation of how the shearing stresses are estimated. Streeter-Amet Co., 4101 N. Ravenswood Ave., Chicago, Ill.

K-266 **Measuring Gloss.** Bulletin 2115, 8½" × 11", 4 pages, describes the Glossmeter for measuring gloss (relative apparent reflectance) from zero to 100%, of any plane surface at any angle between 0° and 70°. American Instrument Co., 8010 Georgia Ave., Silver Spring, Md.

K-267 **Flow Indicator.** Bulletin F II, 8½" × 11", 4 pages, shows construction details of the Henszey flow indicator for water and other force flowing liquids. Henszey Co., Watertown, Wis.

K-268 **Use of Gage Blocks.** Folder, 8½" × 11", 4 pages, illustrates and describes numerous uses of these standards of measurements as they are employed daily in both the inspection departments and in the machine shops. George Scherr Co., Inc., 128 Lafayette St., New York, N. Y.

K-269 **Adjustable-Voltage Electronic Motor Speed Control.** The June-July issue of the **Ohmite News** has an article describing this motor speed control. Ohmite Mfg. Co., 4835 Flournoy St., Chicago, Ill.

K-270 **Dynamotors.** Catalog 100, 8½" × 11", 10 pages, catalogs a number of dynamotors for aircraft, marine, police and all mobile radio equipment. Carter Motor Co., 1608 Milwaukee Ave., Chicago, Ill.

K-271 **Burrell Technical Announces** No. 43-714 of this house organ contains a number of interesting shorts on laboratory equipment and supplies. Burrell Technical Supply Co., 1936 Fifth Ave., Pittsburgh, Pa.

K-272 **Radio Telegraph Apparatus.** Bulletin, 8½" × 11", 10 pages, is a preview of a catalog and illustrates the receiving assembly, the transmitter, the tape puller, the signal leveller and the keying unit. McElroy Mfg. Corp., 82 Brookline Ave., Boston, Mass.

K-273 **Electrical Control Motors.** Catalog A-5, 8½" × 11", 4 pages, illustrated with many photographs and drawings the numerous mounting arrangements with different type valves for the control of air, gas, oil, steam and chemical solutions. Automatic Temperature Control Co., 34 E. Logan St., Philadelphia, Pa.

K-274 **Electronic Tubes.** Loose leaf binder, 8½" × 11", 12 pages, describes some power and transmitting tubes. Includes instructions on operation of mercury vapor rectifier tubes, technical data on 3 types of half-wave mercury vapor rectifiers, 3 types of half-wave high vacuum rectifiers, a multi-purpose medium power vacuum tube and a transmitting triode. Electronic Enterprises, Inc., 65-67 Seventh Ave., Newark, N. J.

K-275 **Balancing Machines.** Bulletin 2[illegible] 8½" × 11" 24 pages, illustrates and fully describes construction and operation of Olsen E-O static-dynamic balancing machines, vertical static and propeller shaft balancing machines; also portable balancing equipment. Includes a drill chart for use in correcting unbalance. Tinius Olsen Testing Machine Co., 500 N. 12 St., Philadelphia, Pa.

K-276 **"Master" Enclosed Rotameters.** Catalog Section 25-D, 8½" × 11", 2[illegible] pages, announces and describes in great detail the new "Master Enclosed Rotameters Series 700," said to possess nine basic advantages over any previous Rotameter. Catalog includes also various data on installation problems, on devices for signaling, recording and automatic control, etc. Fischer & Porter Co., Hatboro, Pa.

K-277 **"The ABC of Electronics at Work."** Booklet, B-3260 5" × 7", 36 pages, explains the fundamental principles of the six basic ways in which electronic tubes function. Schematic drawings of the tube construction and diagrams showing the typical circuits for the various functions are used to explain how electronic tubes rectify, amplify, generate, control, transform light into current and current into light. Industrial and military applications for each of the six basic functions are described and illustrated. Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

K-278 **Rack and Panel Electrical Connectors.** Bulletin DP, 8½" × 11", 28 pages, includes description, applications, illustrations, sketches and tabular data on twelve DP types used in a variety of applications in radio and instrument installations in aircraft, tanks, electrical pipe organs, etc. Cannon Electrical Development Co., 3209 Humboldt St., Los Angeles 31, Calif.

K-279 **Propeller Governor Test.** Folder, 8½" × 11", 4 pages, describes the important features of new test stand for test-

g Hamilton and Curtiss propeller gov-nors. Airplane Mfg. & Supply Corp., 33 Lankershim Blvd., North Hollywood, alif.

K-280 **Mirrors.** Booklet, 4½" × 6½", pages, describes the Pancro mirrors ving superior reflectivity. The follow-g applications are covered: telescope, phthalmic, stereoscope, galvanometer, d semi-transparent mirrors; and mov-g-picture projector, and lamp reflect-s. Pancro Mirrors, Inc., 2958 Los Feliz vd., Los Angeles, Calif.

K-281 **Insulation Testers.** Bulletin 1735, " × 10½", 12 pages, describes the new egger" insulation testers, the first to built in the U. S. A. The instruments e of the generator and direct-reading mmeter type. James G. Biddle Co., 1211 rch St., Philadelphia 7, Pa.

K-282 **Centralized Automatic Combus-on Control.** Bulletin 43-605, 8½" × 11", pages, covers the Hays control. The sential elements are illustrated and scribed. Hays Corp., Michigan City, d.

K-283 **Photoelectric Glossmeter.** Loose af, 8½" × 11", 10 pages, describes thi strument designed for measuring the oss of paints and varnishes, ceramics, astics, paper, and machined or polished etallic or non-metallic surfaces. Photo-olt Corp., 95 Madison Ave., New York, Y.

K-284 **Snap Switches.** Loose leaf folder, " × 11", 10 pages, covers principle operation, general specifications and aracteristics of Acro precision snap witches. Acro Electric Co., 1305 Superior ve., Cleveland, O.

K-285 **Resistance Standards & Resis-nce Bridges.** Bulletin 100, 8½" × 11", pages, describes new portable Kelvin idge, new high precision Wheatstone idge, new Mueller bridge, several older strument and various individual dec-e resistance assemblies. Rubicon Co., dge Ave. at 35th St., Philadelphia, Pa.

K-285 **Photoelectric Colorimeter.** Model 2E, 8½" × 11", 16 pages, describes the metron. Bulletin also includes data on nochromatic filters, sample holders, d accessories for ultraviolet absorp-n, fluorescence, reflection, scattering fect and haze. Photovolt Corp., 95 Mad-on Ave., New York, N. Y.

K-286 **Moisture Teller.** Folder, 8½" × ", 4 pages, lists and illustrates 5 models moisture tester for various materials: emicals, sand, gravel, coal, coke, ores, brics, tobacco, wood, pulp, rubber, pa-r, fiber, sugar, salt, grit, clay, food, d and ceramic materials. Harry W. ietert Co., 9330 Roselawn Ave., Detroit, ich.

K-287 **Level Control.** Sheet 1100, 8½" 11", 4 pages, describes a floatless elec-onic level control for all liquids and owders. Typical applications are illus-ated. Photoswitch, Inc., 77 Broadway, ambridge 42, Mass.

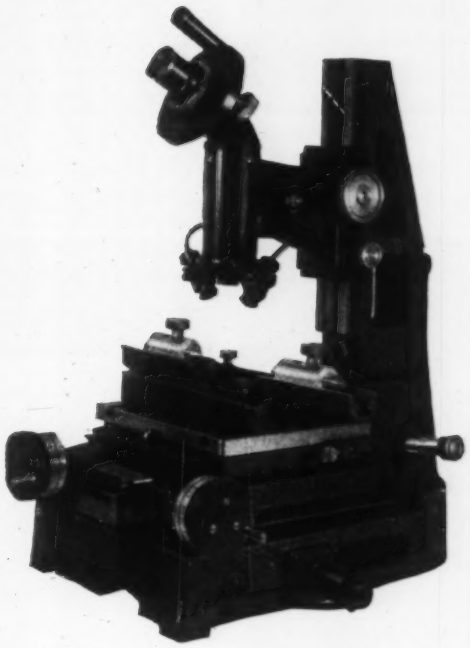
K-288 **Exhaust Pyrometers.** Bulletin 819, 8½" × 11", 6 pages, illustrates a umber of representative installations of haust pyrometers on stationary and arine Diesels. Illinois Testing Labs., c., 420 N. La Salle St., Chicago 10, Ill.

K-289 **Fixture for Testing Plywood anels in Shear.** Bulletin 1431M, 8½" × ", 8 pages, describes a fixture, for use ith the Streeter-Amet tensile testing achine, for subjecting a small panel to niform shearing stress. Streeter-Amet o., 4101 Ravenswood Ave., Chicago 13, l.

K-290 **Controls — Capacitors.** Catalog , 8½" × 11", 12 pages, describes a num-er of resistors, rheostats, capacitors, ush switches, flat switches, lever action witches and position selector switches. entralab Div. of Globe-Union Inc., 900 Keefe Ave., Milwaukee 1, Wis.

K-291 **"Notes on Replacing Du Mont ua Triode Tubes."** The Jan.-Feb. 1943 sue of the *Du Mont Oscillographer* con-ins the above article. Allen B. Du Mont abs., Inc., 2 Main Ave., Passaic, N. J.

K-292 **"Analysis of Vibration."** The uly 1943 issue of the *General Radio xperimenter* discusses the analysis of ibration and the use of the vibration nalyzer. General Radio Co., 30 State St., ambridge 39, Mass.



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